

# **PC CONNECTION**

## **Programmable Terminal**

### **Operation Manual**

*Produced March 1999*

## OMRON Product References

All OMRON products are capitalized in this manual. The word "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch," which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PC" means Programmable Controller and is not used as an abbreviation for anything else.

## Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

**Note** Indicates information of particular interest for efficient and convenient operation of the product.

**1, 2, 3...** 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

### ● Names of Devices and Tools

**PT** Refers to an OMRON NT series programmable terminal.

**PC** Refers to a Mitsubishi A series or FX series programmable controller.

**System installer** Refers to an OMRON NT series system installer.

| PT Type      | Model                             | Applicable PC                               | Personal Computer         |
|--------------|-----------------------------------|---|---------------------------|
| NT31/NT31C   | Attached to the support tool (*1) | Mitsubishi A series<br>Mitsubishi FX series | For IBM PC/AT compatibles |
| NT631/NT631C | Attached to the support tool (*1) | Mitsubishi A series<br>Mitsubishi FX series | For IBM PC/AT compatibles |

(\*1) System program for NT31/NT31C and NT631/NT631C is attached to "NT Series Support Tool for Windows 95/98 (Ver. 3.0)".

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## ***Related Manuals and Their Contents:***

The related manuals are indicated below.

The \* symbol at the end of the manual number is the revision history symbol.

### **[Connections between the programmable terminal (PT) and programmable controllers (PC), etc.]**

#### **This manual**

- PC Connection, Operation Manual . . . . . V042-E1-□

This Operation manual describes how to connect the programmable terminal (PT) to programmable controllers (PC) and other equipment, and how to make the settings required for these connections.

### **[For information on NT series PT functions, operations, and restrictions]**

- NT31/31C Programmable Terminal Operation Manual . . . . . V043-E1-□
- NT631/631C Programmable Terminal Operation Manual . . . V044-E1-□

These manuals contain full descriptions of NT series PT functions, operations, and restrictions.

- NT Series Support Tool for Windows 95/98 (Ver. 3.0) Operation Manual . . . . . V053-E1-□

The screens displayed in the PT are created and transferred with the support tool. This manual describes how to create and transfer the screen data. It describes also how to use the system installer for installing the system program to the PT.

# ***How to Use the Manual***

This Operation Manual comprises the following Sections.

## **SECTION 1   Connectable Hardware Combinations**

This section describes the combinations of PT and programmable controller that can be connected.

This section also describes the types of system program and system installer required for connection with a PC produced by the other manufacturers to operation of such a PC, and the types of usable support tools.

## **SECTION 2   Use with Mitsubishi A Series Computer Link Systems**

This section describes how to make the connections and settings when a PT is connected to a Mitsubishi A series programmable controller in a computer link system.

This section also describes the combinations of PTs and programmable controllers that can be connected, the connection method of cables, the settings required for operation, and the specific errors that may occur when using the PT in a computer link system that uses a Mitsubishi A series programmable controller.

## **SECTION 3   Use with Mitsubishi FX**

This section describes how to make the connections and settings when a PT is connected to a Mitsubishi FX series programmable controller.

This section also describes primarily the combinations of PTs and programmable controllers that can be connected, the connection method of cables, and the settings required for operation.

## **Appendix**

This section describes the differences of the PT functions depending on the connected host and the specifications of the connectors of OMRON products used for communications.

# PRECAUTIONS

This section provides general precautions for using the Programmable Terminal.

**The information contained in this section is important for the safe and reliable application of the Programmable Terminal. You must read this section and understand the information contained before attempting to set up or operate a Programmable Terminal.**

- 1 Intended Audience ..... xi
- 2 General Precautions ..... xi
- 3 Safety Precautions ..... xi

# 1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.


# 2 General Precautions


The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.


This manual provides information for using the Programmable Terminal. Be sure to read this manual before attempting to use the software and keep this manual close at hand for reference during operation.

 **WARNING** It is extremely important that Programmable Terminals related devices be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying Programmable Terminals to the abovementioned applications.

 **WARNING** Do not use input functions such as PT touch switches for applications where danger to human life or serious damage is possible, or for emergency switch applications.

# 3 Safety Precautions

In order to use this product safely and correctly, you must read and fully understand the "Safety Precautions" in the NT series Operation Manual before using it.

 **Caution** After connecting a communication cable, always secure it with the screws. Otherwise the cable may disconnect, causing operation to fail.





# Terminology

- **BCD (binary coded decimal)**

The value is stored as a decimal number instead of as a hexadecimal number by using only 0 to 9 of the hexadecimal numbers (0 to F). By using the decimal representation, the conversion of decimal numbers becomes easy.

For example, when decimal “1234” is to be stored to the channel, it is usually required to be converted to the hexadecimal “04D2”, because the channel is hexadecimal. When using BCD, decimal “1234” is stored as “1234” to the channel.

- **Counter (C)**

Area used by a Mitsubishi PC.

Word device to be used for storing the present value of the counter used for program.

- **Output relay (Y)**

Area used by a Mitsubishi PC.

Bit device connected to an actual output contact. As the case may be, output bits of the specific function module is allocated.

- **State (S)**

Area used by a Mitsubishi PC.

Bit device primarily used for status of processing when using step ladder command or as an annunciator.

- **Contact**

Term for the PLC made by OMRON indicating the minimum unit of I/O. It is set to ON or OFF.

- **Timer (T)**

Area used by a Mitsubishi PC.

Word device to be used for storing the present value of the timer used for program.

- **Direct access**

Connection method in which word bits on a PC and a memory table, lamp, or touch switch correspond one-to-one, and memory contents are automatically updated to reflect any change in one side directly to another.

For example, if bits on a PC corresponding to a PT lamp are turned on, the PT lamp will light up. If a value is written to words on the PC corresponding to a PT value memory table, the same value data is written to the corresponding value memory table.

It is possible to control a PT from a PC without transmitting the command from the PC to the PT allowing rapid communication between the PC and PT by decreasing tasks at the PC side.

- **Channel (CH)**

Term for the PLC made by OMRON. I/O unit for 16 “contacts”. It may expressed as “CH”.

- **Communication speed (bps)**

Data amount possible to be sent and received during period of time. “Bps” is a abbreviation for “bits per second” and refers to the number of bits sent or received in 1 sec.

- **Data register (D)**

Area used by a Mitsubishi PC.

Word device to be used for storing values or words.

In D8000 and higher, it has a specific function for the operation of a PC.

- **Input relay (X)**

Area used by a Mitsubishi PC.

Bit device connected to an actual input contact. As the case may be, input bits of the specific function module are allocated.

- **Bit**

Term for information processing, such as computer, and refers to the minimum unit of data. It can be set to two values, “0” or “1”. In PCs made by Mitsubishi, “contact” is expressed by “bit”. “0” and “1” correspond to “OFF” and “ON”, respectively.

● **Bit device**

Area in Mitsubishi PC for reading and writing primarily by bits.  
There are four types of bit devices usable in the PT.

- M (auxiliary relay)
- S (state)
- X (input relay)
- Y (output relay)

● **Auxiliary relay (M)**

Area used by a Mitsubishi PC.  
Bit device which cannot be connected to an I/O contact, but can be used as I/O in programs.  
In M8000 and higher, there are specific functions for the operation of a PC.

● **Memory switch**

Performs setting related to the PT operation. This is not an actual switch like a DIP switch, but a switch electrically memorized inside the PT.  
It can be set via a “memory switch” of the “maintenance mode” in the PT.

● **Memory table**

Memory inside the PT the user can use for displaying data in the PT. There are two memory tables: the value memory table for storing values and the word memory table for storing words.

● **Word**

Term for information processing, such as computer, and refers to a unit corresponding to “channel”. 16 bits corresponds to 1 word.  
In a Mitsubishi PC, “channel” is expressed as “word”.

● **Word device**

Area in a Mitsubishi PC primarily read by words.  
There are three types of word devices usable in the PT:

- D (data register)
- T (timer)
- C (counter)

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# SECTION 1

## Connectable Hardware Combinations

This section describes the connectable hardware combinations for each type of PT and each connection method. It also describes the types which require installation of a system program.

|     |                                     |   |
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| 1-2 | Installing the System Program ..... | 3 |
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## 1-1 Possible Combinations

The table below shows the combinations that can be connected.

| PT Type              | Model  | Connector | Connection to Mitsubishi A (Computer Link) |         | Connection to Mitsubishi FX |
|----------------------|--|-----------|--|---------|-----------------------------|
|                      |  |           | RS-232C                                    | RS-422A |                             |
| NT31/NT31C<br>(*1)   | NT31-ST121□-EV1<br>NT31C-ST141□-EV1                        | RS-232C   | ○  | □       | ○                           |
|                      |  | RS-422A   | □  | ○       | ○                           |
| NT631/NT631C<br>(*1) | NT631-ST211□-EV1<br>NT631C-ST141□-EV1<br>NT631C-ST151□-EV1 | RS-232C   | ○  | □       | ○                           |
|                      |  | RS-422A   | □  | ○       | ○                           |

○: Direct connection

□ : Via RS-232C/RS-422A convertor unit

(\*1) In order to use NT31/NT31C, NT631S/NT631C in multi-vendor systems, a dedicated system program must be installed in the PT using the "NT series system installer".

## 1-2 Installing the System Program

In order to use an NT31/NT31C or NT631/NT631C in a multi-vendor system, a dedicated system program must be installed in the PT using the “NT series system installer” shown in the table below.

| PT Type      | Model                             | Applicable PC                               | Personal Computer         |
|--------------|-----------------------------------|---|---------------------------|
| NT31/NT31C   | Attached to the support tool (*1) | Mitsubishi A series<br>Mitsubishi FX series | For IBM PC/AT compatibles |
| NT631/NT631C | Attached to the support tool (*1) | Mitsubishi A series<br>Mitsubishi FX series | For IBM PC/AT compatibles |

(\*1) System program for NT31/NT31C and NT631/NT631C is attached to “NT Series Support Tool for Windows 95/98 (Ver. 3.0)” (NT-ZJ3MX1/NT-ZJ3MX1-EV3).

For details on how to operate the system installer, refer to its instruction manual, or the PT Operation manual.

## 1-3 Usable Support Tools

When using the PT in a multi-vendor system, one of the following support tools must be used.

| Model                          | Hardware Requirement      |
|--------------------------------|---------------------------|
| NT-ZJ3MX1-EV3<br>NT-ZJCMX1-EV3 | For IBM PC/AT compatibles |

The programmable controllers (PC) that can be connected to the PT are determined by the "PLC Vendor" data set in the screen data memory board. Accordingly, screen data complying with the programmable controller to be connected must be transferred to the PT in advance.

The "PLC Vendor" is set with the support tool. The applicable programmable controllers (PCs) depending on the "PLC Vendor" setting are as follows.

| PLC Vendor            | Applicable Programmable Controller (PLC)                               |
|-----------------------|--|
| OMRON                 | For connection to an OMRON CS1 series, C series, or CVM1/CV series PLC |
| Mitsubishi A          | For connection to a Mitsubishi Electric MELSEC A series PC             |
| Mitsubishi FX         | For connection to a Mitsubishi Electric MELSEC FX series PC            |
| Memory link (MEMLINK) | For a memory link connection with NT31/NT31C or NT631/NT631C           |

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## SECTION 2

### Use with Mitsubishi A Series Computer Link Systems

This section describes how to make the connections and settings when a PT is connected to a Mitsubishi A series programmable controller in a computer link system.

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## 2-1 Usable PTs and PCs

The PT, PC, and computer link module models that can be used in a computer link system that uses Mitsubishi A series PCs are indicated here.

### Usable PT Models

The PT models that can be used with a computer link system that uses Mitsubishi A series PCs are tabled below.

When using NT31/NT31C, NT631/NT631C, install the system program for Mitsubishi A computer links in advance with the “NT series system installer”.

| PT Type | Model                                  |
|---------|--|
| NT31    | NT31-ST121□-EV1                        |
| NT31C   | NT31C-ST141□-EV1                       |
| NT631   | NT631-ST211□-EV1                       |
| NT631C  | NT631C-ST141□-EV1<br>NT631C-ST151□-EV1 |

**Reference:** For details on the direct connection function, refer to the Operation manual for the PT model used.



## Modules Mounted at the Connected PC

Connections to a Mitsubishi A series PC are made at a computer link module. The table below lists the computer link modules to which the connection can be made with each type of connector.

| Series  | CPU Module  | Computer Link Module Used |               |
|---|---|---------------------------|---------------|
|   |   | RS-232C                   | RS-422        |
| A0J2H   | A0J2HCPU  | A0J2-C214S1               |               |
| A1SH<br>A1SJH<br>A2SH<br>A2US<br>A2US-S1<br>A2USH-S1                        | A1SHCPU<br>A1SJHCPU<br>A2SHCPU<br>A2USCPU<br>A2USCPU-S1<br>A2USHCPU-S1                                    | A1SJ71UC24-R2             | A1SJ71UC24-R4 |
| A1N<br>A2N<br>A2N-S1<br>A3N<br>A2A<br>A2A-S1<br>A3A<br>A2U<br>A2U-S1<br>A3U | A1NCPU<br>A2NCPU<br>A2NCPU-S1<br>A3NCPU<br>A2ACPU<br>A2ACPU-S1<br>A3ACPU<br>A2UCPU<br>A2UCPU-S1<br>A3UCPU | AJ71UC24                  |               |

## **2-2 Connection**

This section describes the methods for connection between the PT and the computer link module.

Make cables that are suitable for the conditions of use, following the wiring details given in this section.

The communication connector (terminal block) of each device is as follows:

- NT31/NT31C
  - Serial port A (RS-232C dedicated connector)
  - Serial port B (switching RS-232C/RS-422A/485 connectors)
- NT631/NT631C
  - Serial port A (RS-232C dedicated connector)
  - Serial port B (switching RS-232C connector and RS-422A/485 terminal blocks)
- Computer link module
  - RS-232C connector or RS-422A terminal block

## Parts Required for Connection

The connectors, connector covers, crimp terminals, and recommended cables for use with OMRON products are described here.

For details on the connectors, connector covers, and crimp terminals used at the computer link module side, refer to the manual for the computer link module.

### ● Parts for RS-232C (Common to PT and NT-AL001)

| Part            | Model                   | Remarks   |
|-----------------|-------------------------|---|
| Connector       | XM2A-0901               | 9-pin type, made by OMRON                             |
|                 | XM2A-2501               | 25-pin type, made by OMRON                            |
|                 | DE-9P                   | 9-pin type, made by JAE                               |
| Connector cover | XM2S-0911               | 9-pin type, made by OMRON                             |
|                 | XM2S-2511               | 25-pin type, made by OMRON                            |
|                 | DE-CI-J6                | 9-pin type, made by JAE                               |
| Cable           | AWG28×5P<br>IFVV-SB     | Multi-core shielded cable, made by Fujikura, Ltd      |
|                 | CO-MA-VV-SB<br>5P×28AWG | Multi-core shielded cable, made by Hitachi Cable, Ltd |

### ● Recommended Parts for RS-422A Terminal Block (For NT631/NT631C)

<Appropriate crimp terminals>

Fork type

6.2 mm or less



Round type

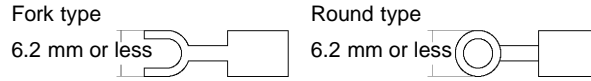
6.2 mm or less



| Part                  | Model                           | Remarks   |
|-----------------------|---------------------------------|---|
| Crimp terminal (M3.5) | 2-YS3A                          | Fork type, made by Japan Solderless Terminal MFG  |
|                       | 2-YAS3.5                        | Fork type, made by Fuji Terminal                  |
|                       | 2Y-3.5                          | Fork type, made by Nichifu Terminal               |
|                       | 2-3.5                           | Round type, made by Japan Solderless Terminal MFG |
|                       | V2-S3.5                         | Round type, made by Fuji Terminal                 |
|                       | 2-3.5                           | Round type, made by Nichifu Terminal              |
| Cable                 | H-9293A<br>(CO-HC-ESV-3P×7/0.2) | Made by Hirakawa Hewtech corp.                    |

● Recommended Parts for RS-422A Terminal Blocks (For NT-AL001)

<Appropriate crimp terminals>



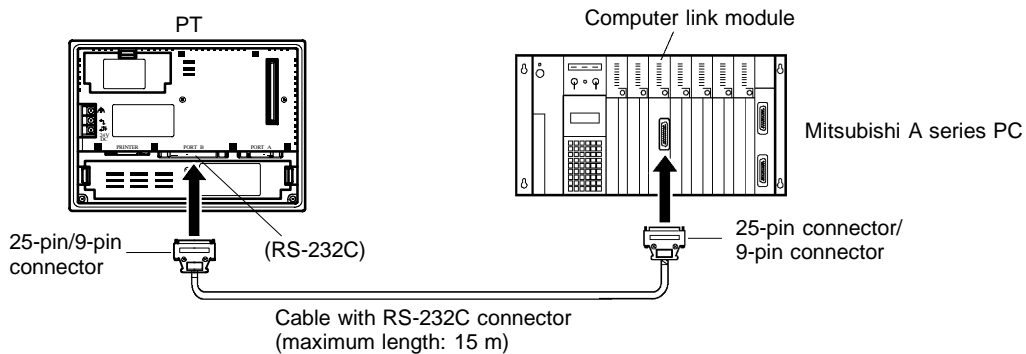
| Part                     | Model      | Remarks  |
|--------------------------|------------|--|
| Crimp terminal (M3) (*1) | Y1.25-3.5L | Fork type, made by molex                         |
|                          | 1.25-N3A   | Fork type, made by Japan Solderless Terminal MFG |

(\*1) Appropriate wire size: 0.3 to 0.75 mm<sup>2</sup>

**Connection Between RS-232C (PT) and RS-232C (Computer Link)**

At the PT side, make connections using the following communication ports.

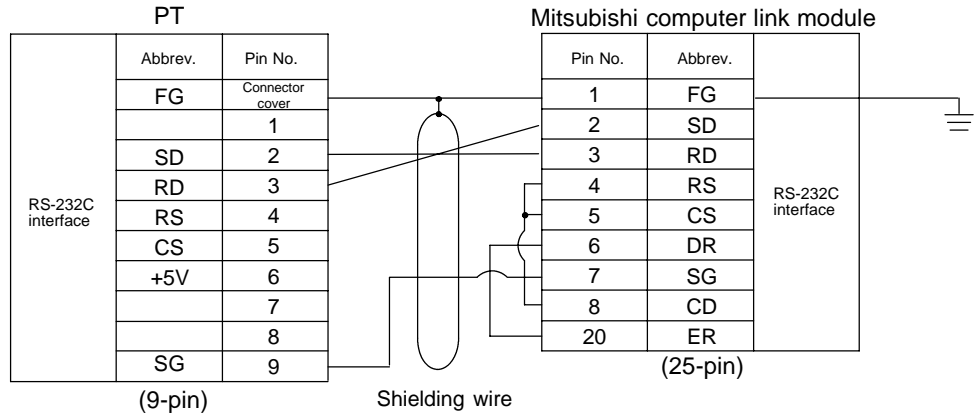
- NT31/NT31C, NT631/NT631C serial port A (dedicated to RS-232C) or serial port B (RS-232C)



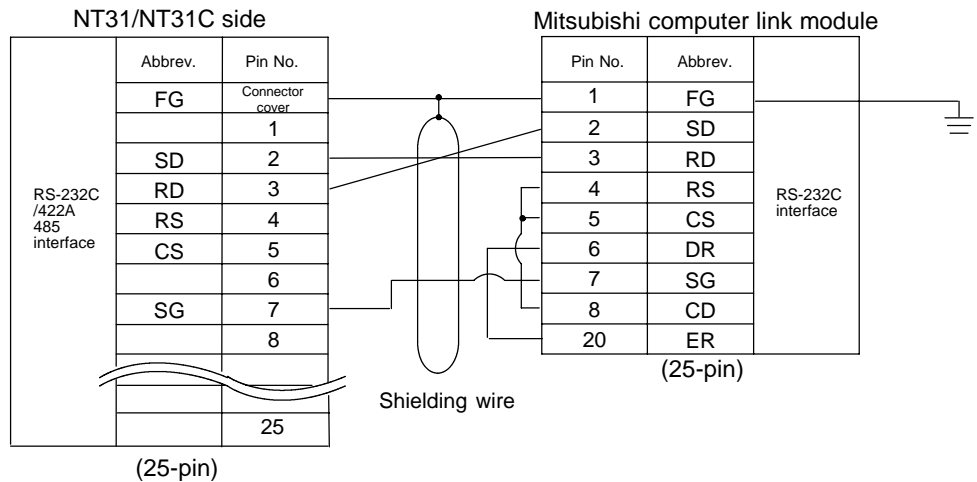
- Notice:**
- After connecting a communication cable, always secure it with the screws.
  - When connecting to a terminal block, always use crimp terminals.

● Wiring When Computer Link Module has a 25-pin Connector

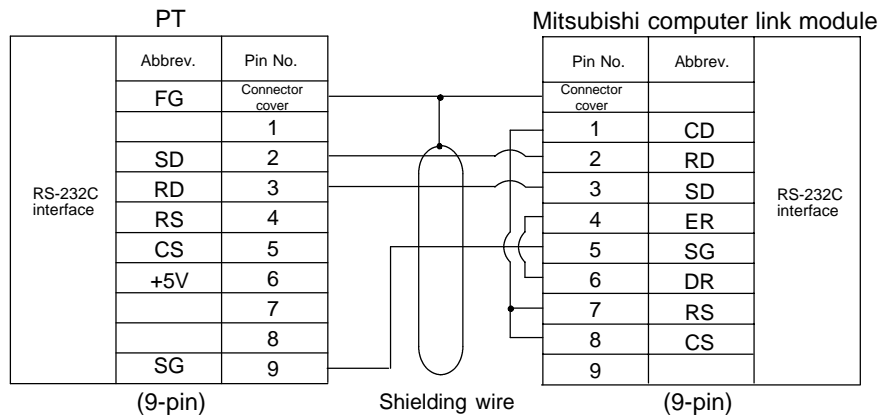
There is a shielding wire at the computer link module side only: connect it to the connector cover and to the No.1 pin (FG).



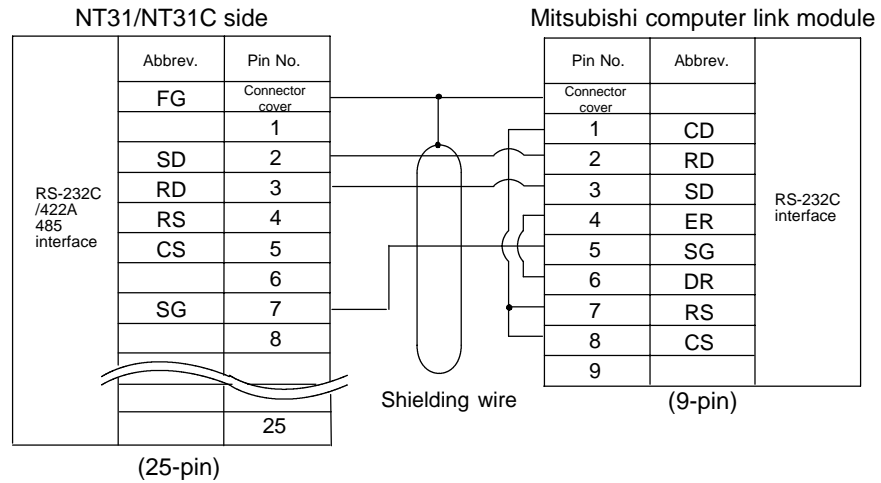
〈When using NT31/31C serial port B〉



● Wiring When Computer Link Module has a 9-pin Connector



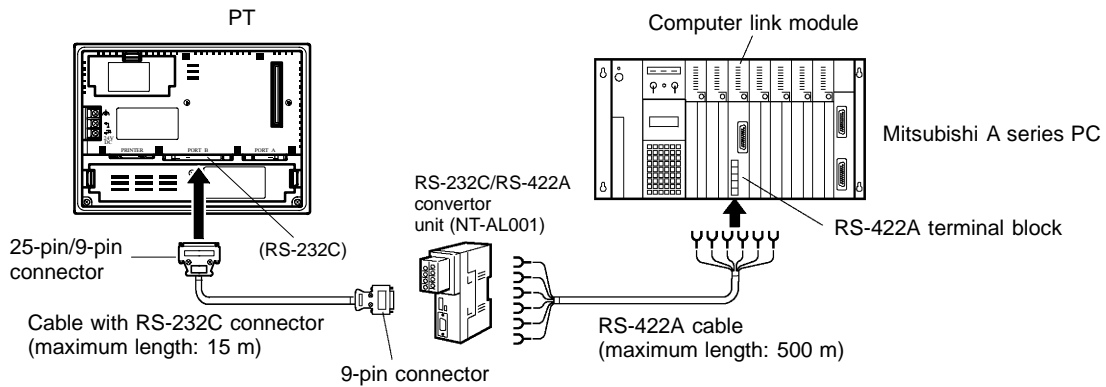
(When using NT31/31C serial port B)



### Connection Between RS-232C (PT) and RS-422A (Computer Link Module)

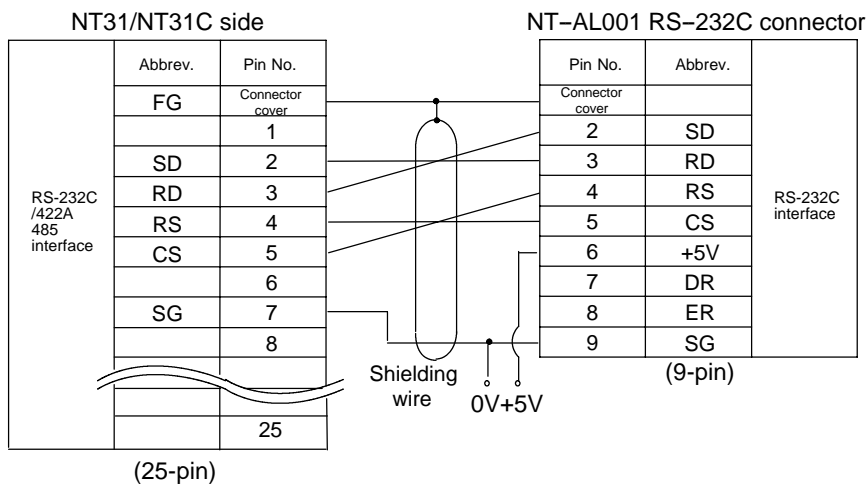
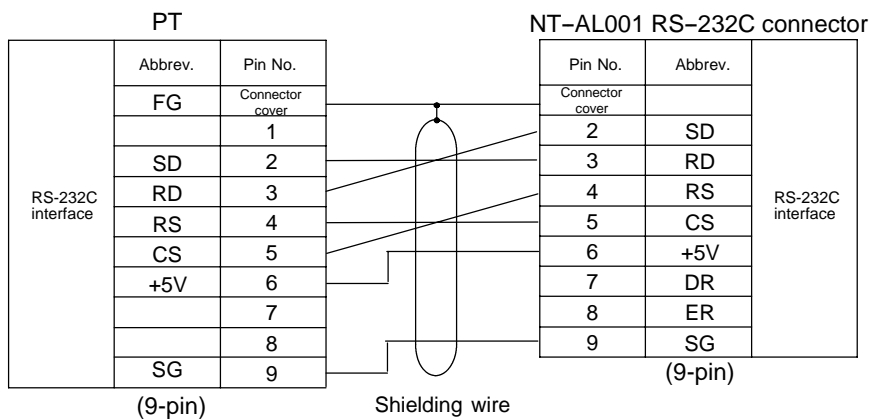
On the PT side, make connections using the following communication ports.

- NT31/NT31C, NT631/NT631C serial port A (RS-232C) or serial port B (RS-232C)



- Notice:**
- After connecting a communication cable, always secure it with the screws.
  - When connecting to a terminal block, always use crimp terminals.

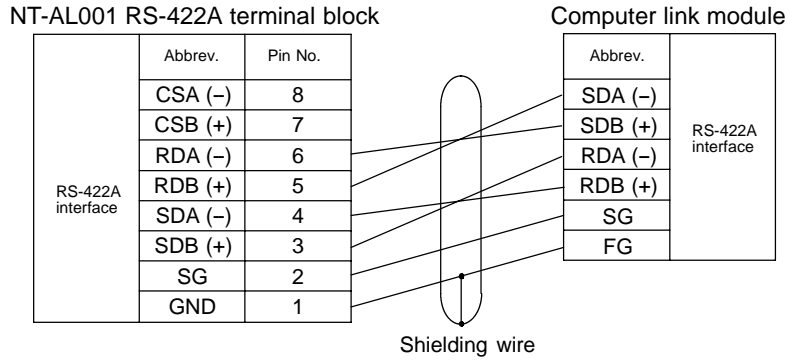
● Wiring Between PT and NT-AL001



**Reference:** +5 is not output from serial port B of NT31/NT31C and NT631/NT631C. The power for NT-AL001 should be supplied externally.

● **Wiring Between NT-AL001 and Computer Link Module**

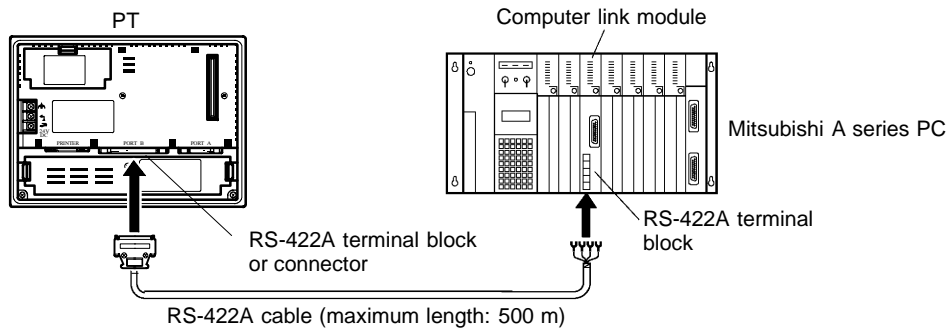
Make the connections between SDB and SDA, and RDB and RDA, with twisted pair wires



**Connection Between RS-422A (PT) and RS-422A (Computer Link Module)**

At the PT side, make a connection using the following communication ports.

- NT631/NT631C  
RS-422A terminal block
- NT31/NT31C  
Serial port B (RS-422A)

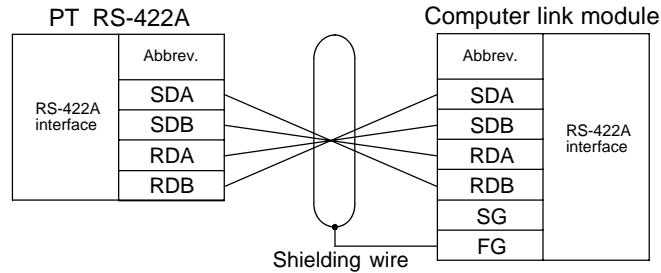


- Notice:**
- After connecting a communication cable, always secure it with the screws.
  - When connecting to a terminal block, always use crimp terminals.



● Wiring

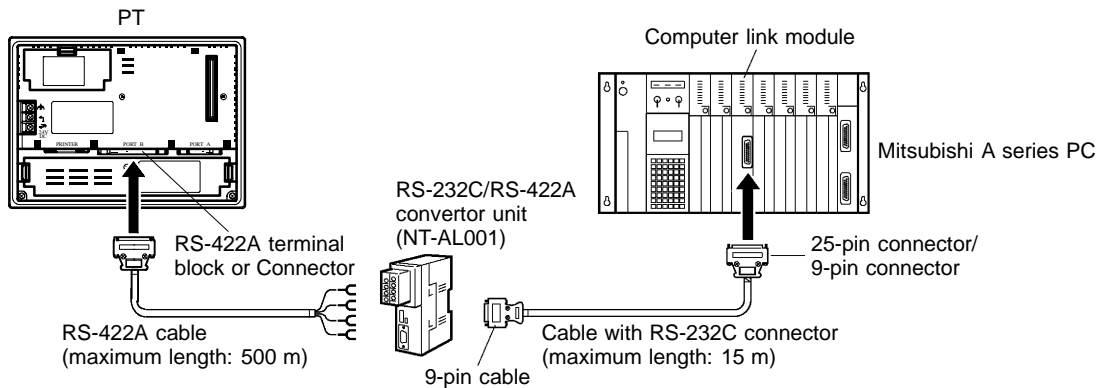
Make the connections between SDB and SDA, and RDB and RDA, with twisted pair wires.



**Connection Between RS-422A (PT) and RS-232C (Computer Link)**

At the PT side, make connections using the following communication ports.

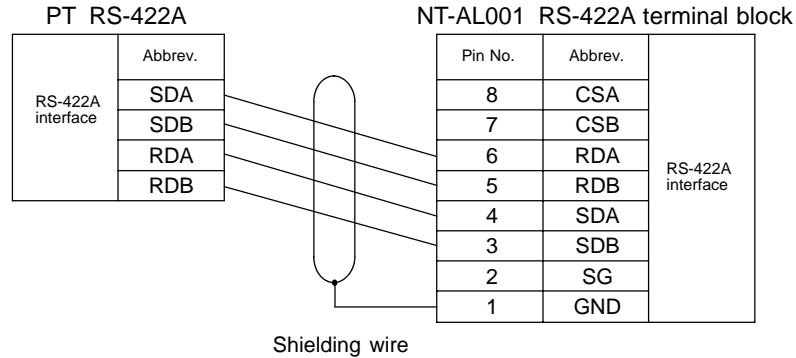
- NT631/NT631C  
RS-422A terminal block
- NT31/NT31C  
Serial port B (RS-422A)



- Notice:**
- After connecting a communication cable, always secure it with the screws.
  - When connecting to a terminal block, always use crimp terminals.

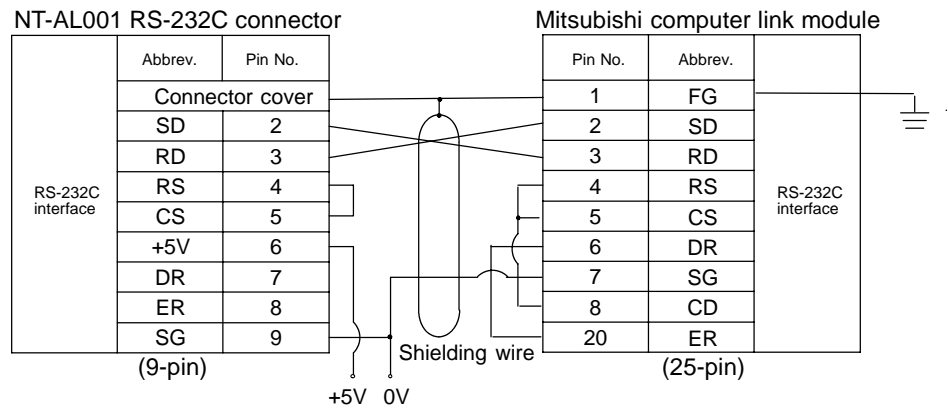
● **Wiring Between PT and NT-AL001**

Make the connections between SDB and SDA, and RDB and RDA, with twisted pair wires.



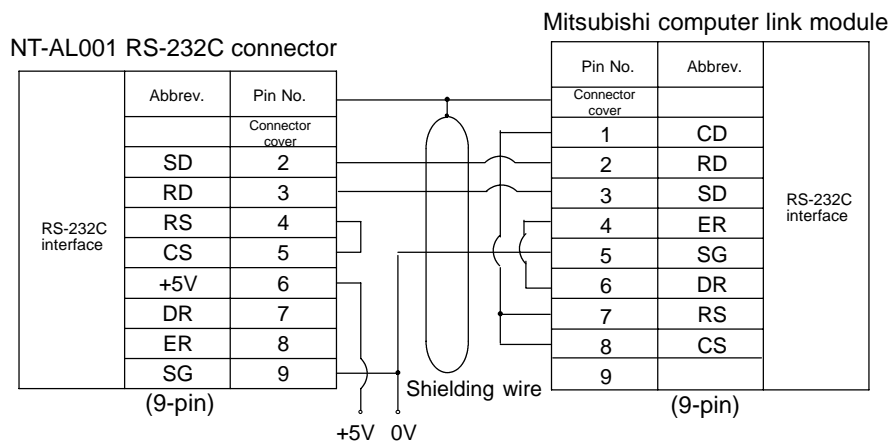
● **Wiring to NT-AL001 when Computer Link Module has 25-pin Connector**

Connect the power supply to the NT-AL001 (5 VDC) at pin No.6 (+5V) and pin No.9 (SG) of the RS-232C connector.



● **Wiring to NT-AL001 when Computer Link Module has 9-pin Connector**

Connect the power supply to the NT-AL001 (5 VDC) at pin No.6 (+5V) and pin No.9 (SG) of the RS-232C connector.

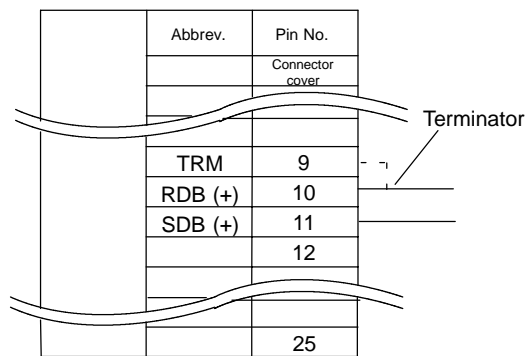


## Setting of Terminator When Using NT31/NT31C or NT631/NT631C

When using NT31/NT31C or NT/631/NT631C, terminator present/absent when using RS-422A is set by a “terminal for terminator (TRM)”. When connecting a PT to a Mitsubishi A series PC with an RS-422A communication, set the terminator at the PT side as follows.

### ● When Using NT31/NT31C

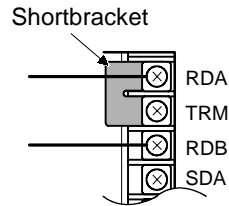
When using NT31/NT31C, there is a “terminator setting terminal” on serial port B connector. Short the No.9 and 10 terminals of serial port B inside the connector, and set the terminator to “ON (present)”.



| Between No.9 and 10 terminals | Function   |
|-------------------------------|--|
| Shortcircuit                  | Terminator ON<br>Shorts only when connecting to the end terminal of RS-422A/485 cable.                           |
| Open circuit                  | Terminator OFF<br>Opens only when connecting to a terminal other than the end terminal of the RS-422A/485 cable. |

● When Using NT631/NT631C

When using NT631/NT631C, there is a “terminal for terminator” on serial port B terminal block. Short the TRM and RDA terminals of serial port B using the short bracket, and set the terminator to “ON (present)”.



| Between TRM and RDA terminals | Function   |
|-------------------------------|--|
| Shortcircuit                  | Terminator ON<br>Shorts only when connecting to the end terminal of RS-422A/485 cable.                           |
| Open circuit                  | Terminator OFF<br>Opens only when connecting to a terminal other than the end terminal of the RS-422A/485 cable. |

## 2-3 Setting

This section describes the settings required at each device in order to use a computer link system that uses Mitsubishi A series PCs.

### Settings at the PT

Make the following settings in the PT's maintenance mode by using the memory switches. When using NT31/NT31C or NT631/NT631C, install the system program for Mitsubishi A computer links in advance using the "NT series system installer".

**Reference:** Set the other memory switches in accordance with the conditions of use.

| Item                           | Setting               |
|--------------------------------|-----------------------|
| Port select (*1)               | RS-232C or RS-422A    |
| Comm. Type (*2)                | Computer link         |
| Baud Rate                      | 9600 bps or 19200 bps |
| PC type                        | AnN, AnA, or AnU      |
| Communication automatic reset  | ON/OFF                |
| Time-out supervising time (*3) | 1 to 10 sec.          |
| Communication retrying (*3)    | 0 to 255 times        |

(\*1) NT31/NT31C and NT631/NT631C only

(\*2) The screen representation of the items to be set differs a little according to the PT model.

(\*3) NT31/NT31C and NT631/NT631C only

For the "PC type" item, set the type of CPU module as follows.

| Setting | CPU Module                               |                         |             |
|---------|--|-------------------------|-------------|
| AnN     | A0J2HCPU<br>A1SHCPU<br>A2SHCPU<br>A3NCPU | A1SJHCPU<br>A2NCPU      | A2NCPU-S1   |
| AnA     | A2ACPU<br>A3ACPU                         | A2ACPU-S1               |             |
| AnU     | A2UCPU<br>A2USCPU<br>A3UCPU              | A2UCPU-S1<br>A2USCPU-S1 | A2USHCPU-S1 |

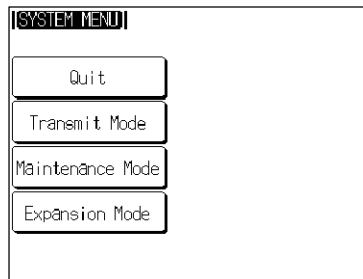
## Operation of the System Menu of the PT

Setting of communication conditions and checking of communication status are performed by operating the system menu of the PT. When using NT31/NT31C or NT631/NT631C, the communication port to be used is also selected by operating the system menu.

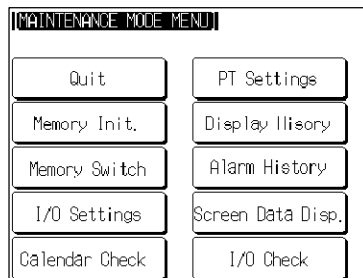
The operation method of the system menu related to the Mitsubishi A series PC is described here, by taking NT31/NT31C as an example. For the operation of the other system menu, refer to the Operation Manual for the PT model used.

### ● Setting of the Communication Conditions

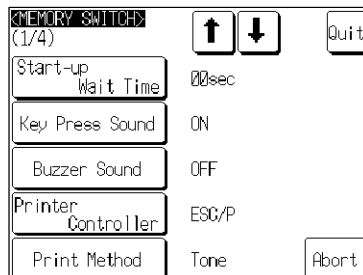
The communication conditions for the computer link system that uses Mitsubishi A series PCs should be set to serial port A or B by operating the system menu as follows:



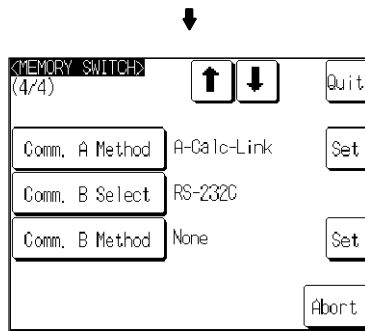
Select "Maintenance Mode".



Select "Memory Switch".

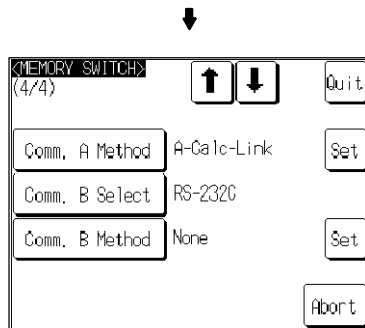


Press [↓] (next screen) or [↑] (previous screen) to display the fourth screen of the memory switch setting screens.



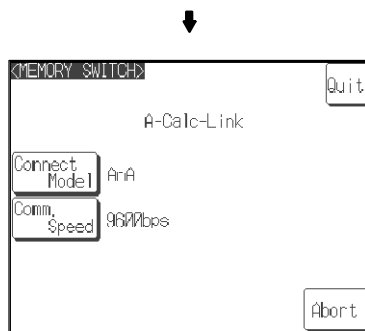
Press the touch switch of the port (“Comm. A Method” or “Comm. B Method”), to which the computer link system that uses Mitsubishi A series PCs is to be set, to display “A-Calc-Link”.

The display on the right of each touch switch will be changed by pressing the switch.



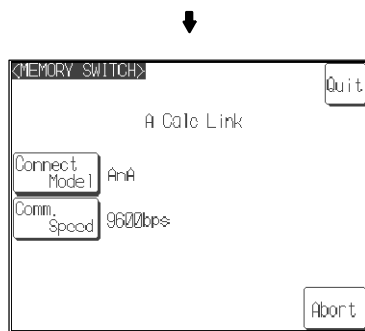
Press the “Set” on the right of the touch switch of the selected port.

The screen on the left shows the case when serial port A is to be used.



Press the “Connect Model” and “Comm. Speed” to select the type of the host to be connected and the communication speed.

The display on the right of each touch switch will be changed by pressing the switch.



Press “Quit”.

The selected connected host type and the communication speed are displayed.

If “Abort” is pressed on the setting screen for the connected host type and communication speed, the memory switch setting screen (fourth screen) returns without executing setting of the connected host type and communication speed.

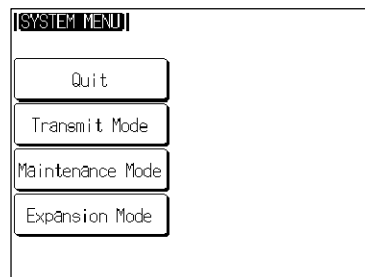
When the setting of the connected host type and communication speed is completed, the memory switch setting screen (fourth screen) returns.

To set the other memory switches, switch the screen by pressing [↓] (next screen) or [↑] (previous screen) to select the screen to set the desired setting item.

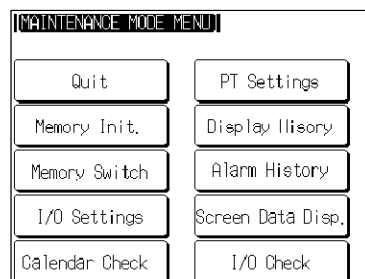
- If “Quit” is pressed on the memory switch setting screen, the memory switch is set as displayed on the screen, then returns to “MAINTENANCE MODE MENU”.
- If “Quit” is pressed on the memory switch setting screen, setting of the memory switch is canceled, then returns to “MAINTENANCE MODE MENU”.

### ● Check of the Communication I/F

When using NT31/NT31C or NT631/NT631C, the communication when connecting to the computer link system that uses Mitsubishi A series PCs can be checked by the following operations.



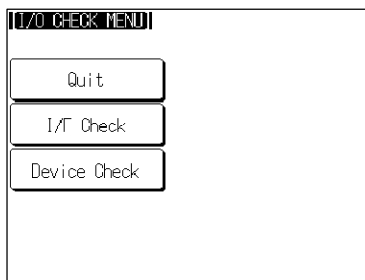
Select “Maintenance Mode”.



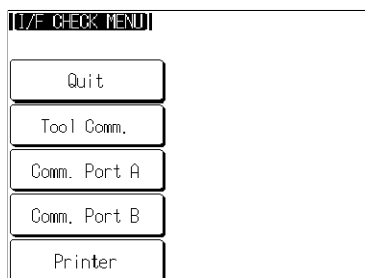
Select “I/O Check”.



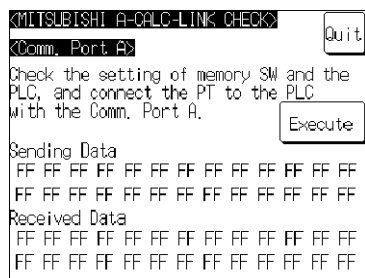




Select "I/F Check".



Press "Comm. Port A" or "Comm. Port B".  
The check screen appears.



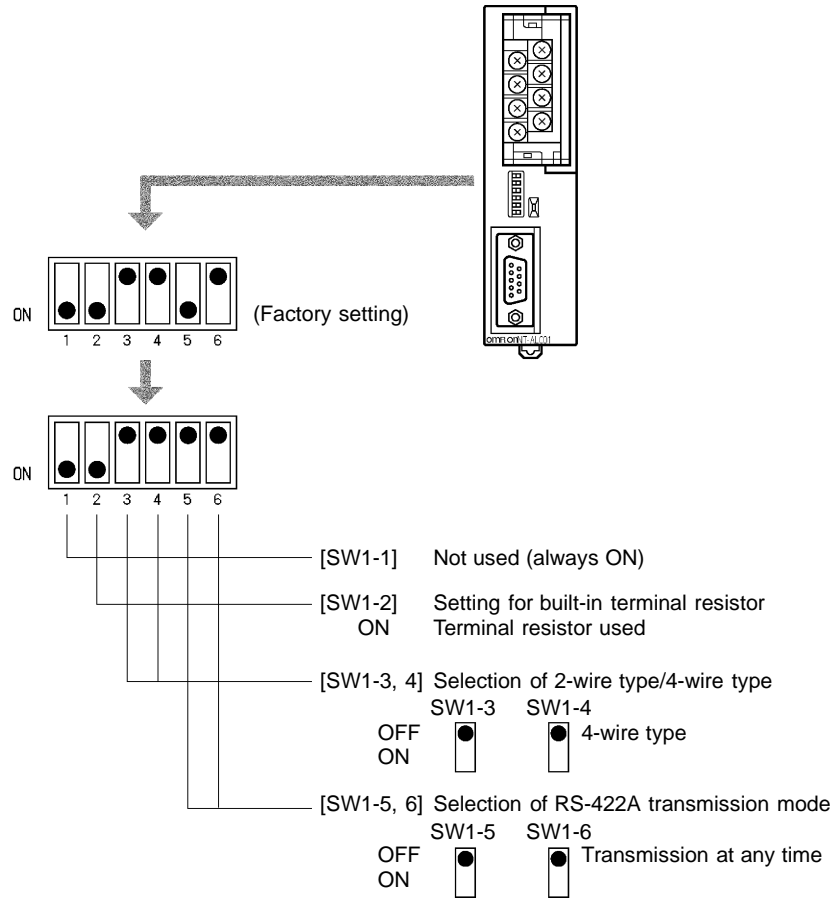
To execute checking, press "Execute".  
The data is transmitted to the host for checking the communication and displayed on "Sending Data" in hexadecimal.  
The screen on the left shows the case when serial port A is to be checked.

- If communication with the host is performed normally, the response from the host is displayed on "Received Data" in hexadecimal.
- If communication with the host is not performed normally, the communication error display (serial port A communication error) appears.

If the communication error display appears on the communication I/F check screen, there is a problem with communication. Check the setting of the communication table, memory switch, or host.

## Settings for NT-AL001

When using the RS-232C/RS-422 convertor unit (NT-AL001), set the RS-422A communication conditions with the DIP switches as shown in the figure below.



## Computer Link Module Settings

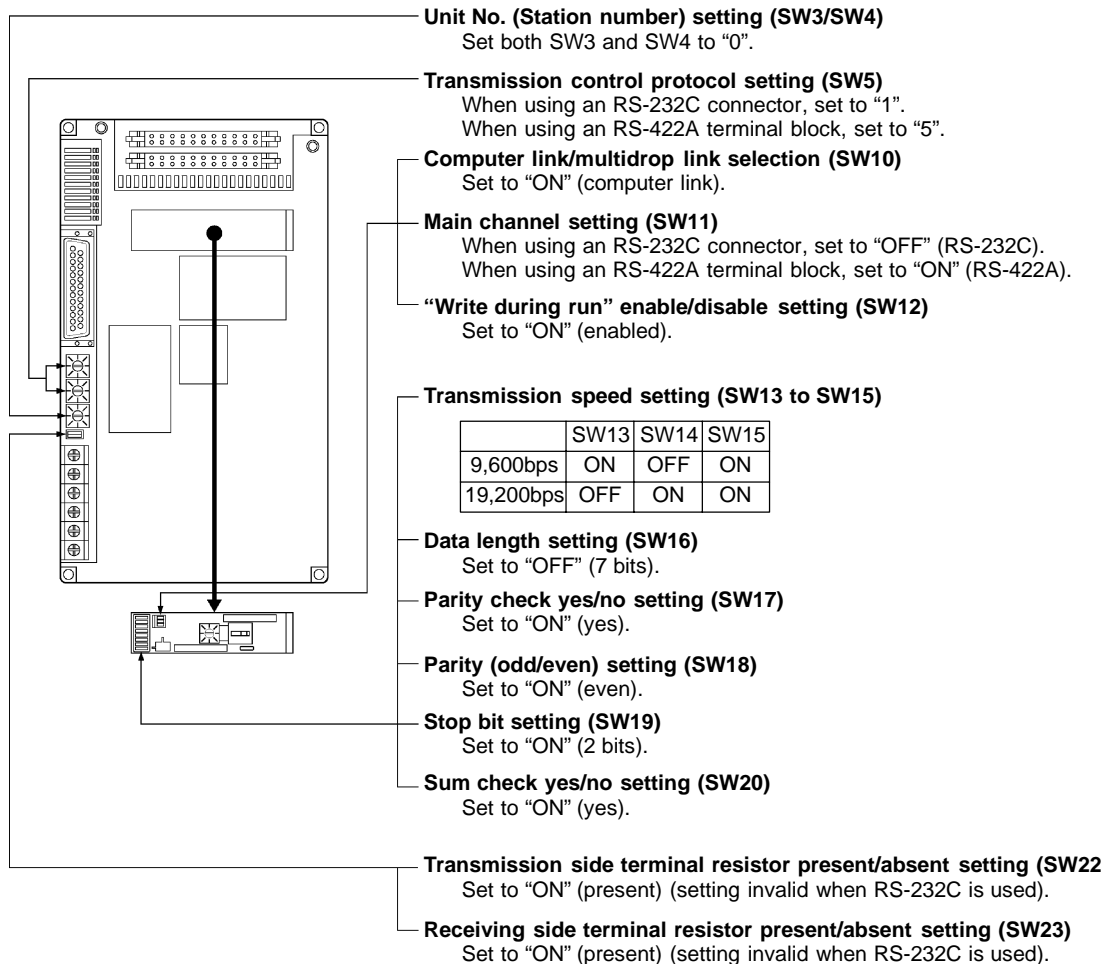
After connecting the PT and PC, set the conditions in the table below at the computer link module at the PC side.

Set these conditions using the switches provided on each type of module by following the instructions given below.

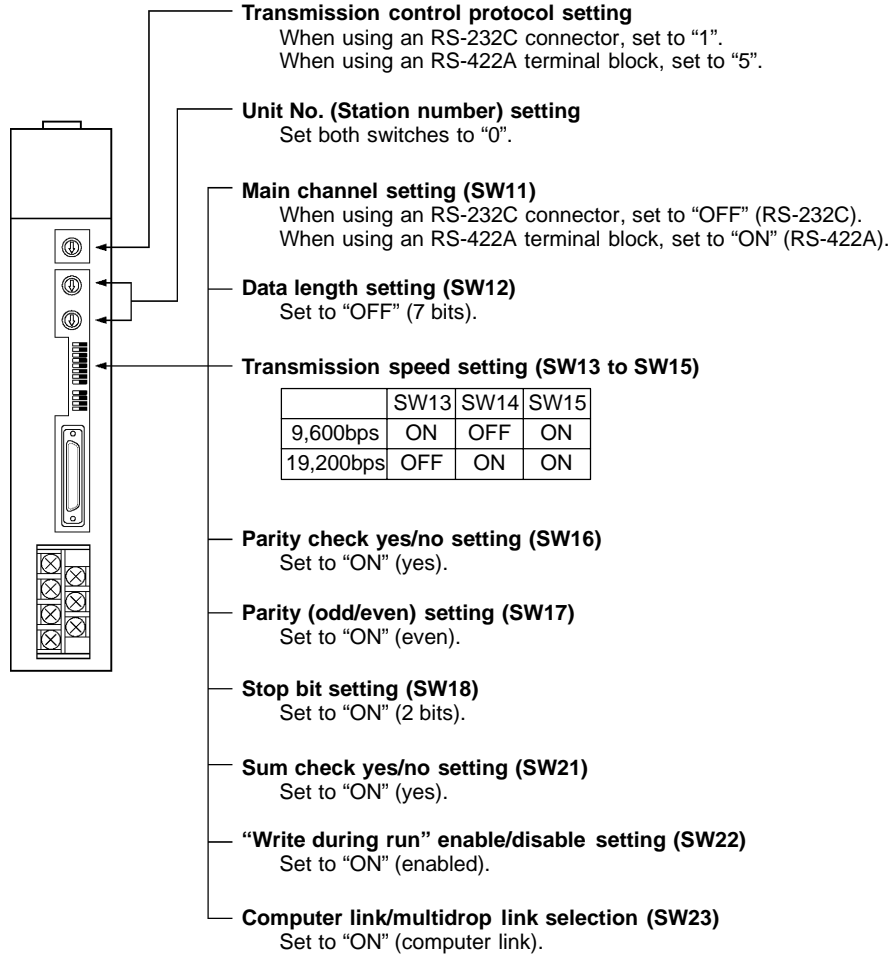
For a detailed explanation of the setting method, refer to the Operation Manual for each module.

| Item                      | Setting                                  |                                      |
|---------------------------|--|--------------------------------------|
|                           | When using an RS-232C connector          | When using an RS-422A terminal block |
| I/O port                  | RS-232C                                  | RS-422A                              |
| Baud rate                 | Set the same baud rate as set at the PT. |                                      |
| Transmission format       | ASCII 7 bits, 2 stop bits                |                                      |
| Parity                    | Even                                     |                                      |
| Control protocol          | Type 1                                   |                                      |
| Unit No. (Station number) | 00                                       |                                      |

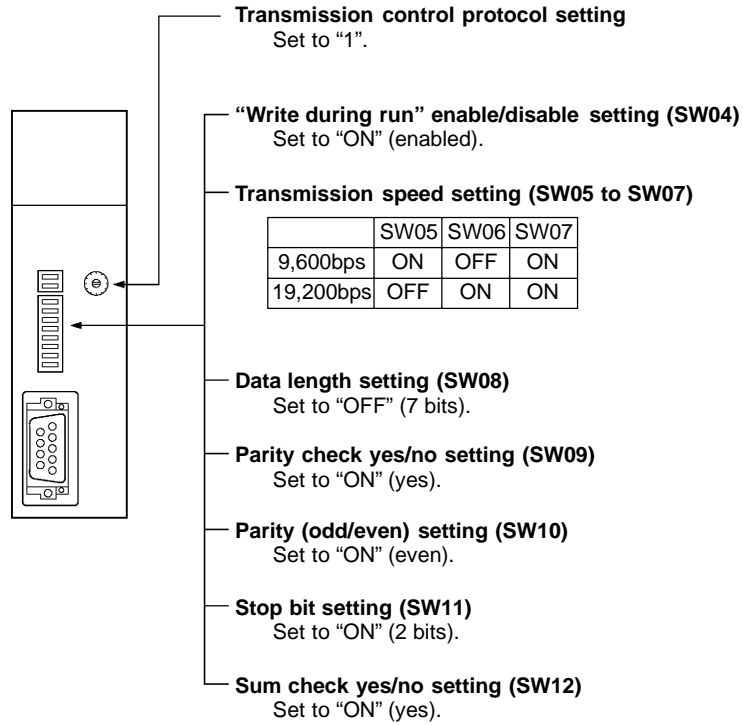
### <A0J2-C214S1>



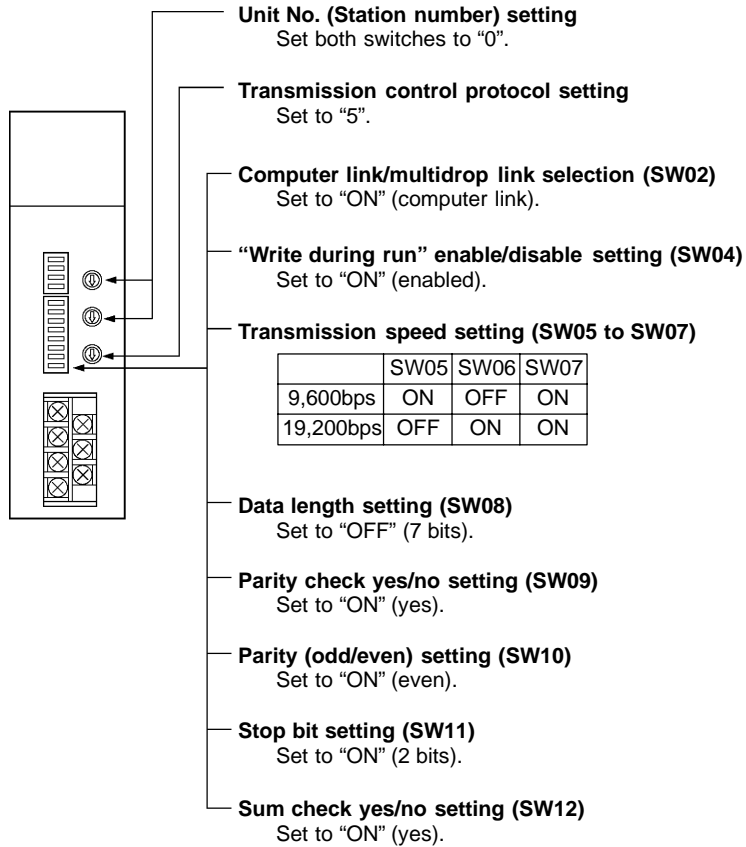
<AJ71UC24>



<A1SJ71UC24-R2> (RS-232C dedicated)



<A1SJ71UC24-R4> (RS-422A dedicated)



## 2-4 Allocation Areas

This section describes the types of area to which bits and words can be allocated, and the ranges of these areas for each PC.

### Bits and Words Allocated to the PC

Bits and words can be allocated to Mitsubishi A series PCs as follows.

| Symbol | Area Name                             | Bit | Word          |                     |
|--------|---------------------------------------|-----|---------------|---------------------|
|        |                                       |     | Numeric Value | Character String(*) |
| D      | Data registers                        | ✓   | ✓             | ✓                   |
| M      | Internal relays                       | ✓   | ✓             | ✓                   |
| T      | Timers                                | ×   | □             | ×                   |
| C      | Counters                              | ×   | □             | ×                   |
| L      | Latching relays                       | ✓   | ✓             | ✓                   |
| B      | Link relays<br>(hexadecimal input)    | ✓   | ✓             | ✓                   |
| W      | Link registers<br>(hexadecimal input) | ✓   | ✓             | ✓                   |
| X      | Input relays<br>(hexadecimal input)   | ✓   | ✓             | ✓                   |
| Y      | Output relays<br>(hexadecimal input)  | ✓   | ✓             | ✓                   |
| R      | File registers                        | ✓   | ✓             | ✓                   |

(\*4) Includes the PT status control area and PT status notify area

✓: Possible      □: Possible (1 word only)      ×: Not possible

#### ● Restrictions on Use

The restrictions and cautions that apply specifically when using a PT with a computer link system that uses Mitsubishi A series PCs are presented here. For details on other, general restrictions, refer to the Operation Manual for the PT model used.

#### Values usable by the PT

- When using NT31/NT31C or NT631/NT631C

The value representation used in the PT can be specified to "BCD" (binary coded decimal) or "binary" (hexadecimal).

The value representation (BCD/binary) can be specified for all memory tables at once by using the support tool "PT configuration" - "system" - "Numeral storage type".

The representation of the values can be specified for each memory table.

**Bit notification**

Notification can be conducted in bit units to bit devices. In this case, the bits other than those used for notification will not be changed.

To word devices, notification is conducted in word units, and the other bits in the same word of the bit used for notification may be changed (on the notification contact between the momentary touch switch and the external I/O input, the other bit in the same word will be cleared to "0").

**Points to be noted when allocating words to bit devices**

When notifying in word units to the bit devices, the PT is accessed in 16-bit units. Therefore, when allocating words (channels) to bit devices, be sure to set a device No. which is multiple of 16.

**Points to be noted when using word devices**

T (timer) and C (counter) can be notified in word units only.

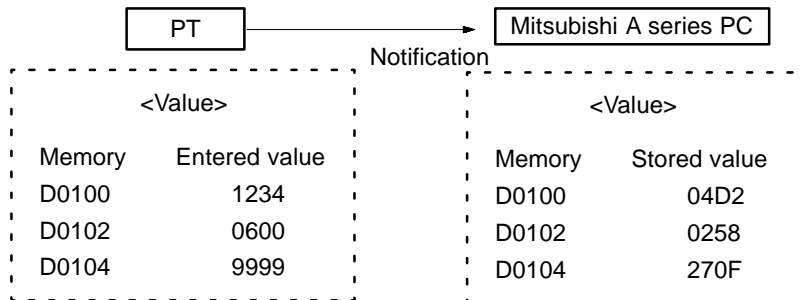
To the word devices other than T (timer) and C (counter), both bits and words can be allocated.

**Numeral storage type at the PT side**

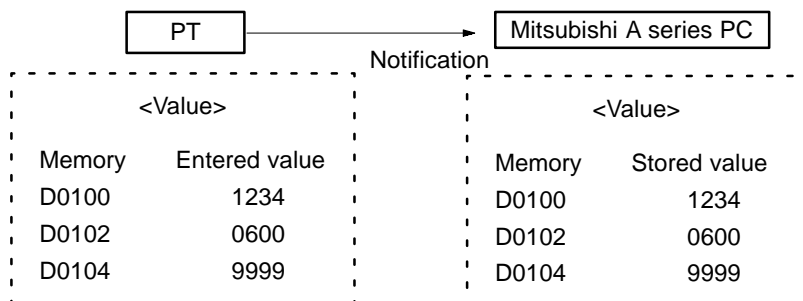
When using NT31/NT31C or NT631/NT631C, the values can be stored in the host in BCD or binary (hexadecimal) by specifying "value representation".

The representation normally used in the Mitsubishi A series PC is binary. Therefore, by specifying the value representation at the PT side to "binary", the values changed at the PT side can be notified as they are to the host.

**(Example)** When the value representation at the PT side is specified to "BCD", the value is entered at the PT side:  
(Allocated channel: 1 channel)



**(Example)** When the value representation at the PT side is specified to "binary", the value is entered at the PT side:  
(Allocated channel: 1 channel)





**Reference:** When using a PT in which “Numeral storage type” can be specified, the value representation can be specified to “BCD” or “binary” for all the value memory tables, or by each value memory table.

For the details on how to use the value representation, refer to Operation Manual for NT31/NT31C or NT631/NTC (V044-E1-□, V043-E1-□). For the details on how to specify the value representation, refer to Operation Manual for NT series Support Tool for Windows 95/98 (Ver. 3.0) (V053-E1-□).

### Mitsubishi A Series PC Allocation Areas

| PC \ Area   | Bit Devices (Bit Units) |                   |                 |                     |                  |                             |                |
|-------------|-------------------------|-------------------|-----------------|---------------------|------------------|-----------------------------|----------------|
|             | Input Relays (X)        | Output Relays (Y) | Link Relays (B) | Internal Relays (M) | Latch Relays (L) | Special Internal Relays (M) |                |
| A0J2HCPU    | 0000 to 01DF            | 0000 to 01DF      | B0000 to B03FF  | M0000 to M2047      | L0000 to L2047   | M9008 to M9247              |                |
| A1SHCPU     | 0000 to 00FF            | 0000 to 00FF      |                 |                     |                  |                             |                |
| A1SJCPU     | 0000 to 00FF            | 0000 to 00FF      |                 |                     |                  |                             |                |
| A2SHCPU     | 0000 to 01FF            | 0000 to 01FF      |                 |                     |                  |                             |                |
| A2NCPU      | 0000 to 01FF            | 0000 to 01FF      |                 |                     |                  |                             |                |
| A2NCPU-S1   | 0000 to 03FF            | 0000 to 03FF      |                 |                     |                  |                             |                |
| A3NCPU      | 0000 to 07FF            | 0000 to 07FF      |                 |                     |                  |                             |                |
| A2ACPU      | 0000 to 01FF            | 0000 to 01FF      | B0000 to B0FFF  | M0000 to M8191      | L0000 to L8191   |                             |                |
| A2ACPU-S1   | 0000 to 03FF            | 0000 to 03FF      |                 |                     |                  |                             |                |
| A3ACPU      | 0000 to 07FF            | 0000 to 07FF      |                 |                     |                  |                             |                |
| A2UCPU      | 0000 to 01FF            | 0000 to 01FF      | B0000 to B1FFF  |                     |                  |                             |                |
| A2UCPU-S1   | 0000 to 03FF            | 0000 to 03FF      |                 |                     |                  |                             |                |
| A2USCPU     | 0000 to 01FF            | 0000 to 01FF      |                 |                     |                  |                             |                |
| A2USCPU-S1  | 0000 to 03FF            | 0000 to 03FF      |                 |                     |                  |                             |                |
| A2USHCPU-S1 | 0000 to 1FFF            | 0000 to 1FFF      | B0000 to B1FFF  |                     |                  | M0000 to M8191              | L0000 to L2047 |
| A3UCPU      | 0000 to 07FF            | 0000 to 07FF      | B0000 to B1FFF  |                     |                  | M0000 to M8191              | L0000 to L8191 |

**Reference:** • The values indicated in the table above are the ranges that can actually be set with the support tool and used by the PT.

- The ranges actually usable differ according to the system configuration.

| PC \ Area    | Word Devices       |                |                |                    |                    |                            |
|--------------|--------------------|----------------|----------------|--------------------|--------------------|----------------------------|
|              | Data Registers (D) | Timers (T)     | Counters (C)   | Link Registers (W) | File Registers (R) | Special Data Registers (D) |
| A0J2HCPU     | D0000 to D1023     | T0000 to T0255 | C0000 to C0255 | W0000 to W03FF     | R0000 to R4095     | D9000 to D9255             |
| A1SHCPU      |                    |                |                |                    |                    |                            |
| A1SJCPU      |                    |                |                |                    |                    |                            |
| A2SHCPU      |                    |                |                |                    |                    |                            |
| A2NCPUCPU    |                    |                |                |                    |                    |                            |
| A2NCPUCPU-S1 |                    |                |                |                    |                    |                            |
| A3NCPUCPU    |                    |                |                |                    |                    |                            |
| A2ACPU       | D0000 to D6143     | T0000 to T2047 | C0000 to C1023 | W0000 to W0FFF     |                    |                            |
| A2ACPU-S1    |                    |                |                |                    |                    |                            |
| A3ACPU       |                    |                |                |                    |                    |                            |
| A2UCPU       | D0000 to D8191     | T0000 to T2047 | C0000 to C1023 | W0000 to W1FFF     | R0000 to R8191     |                            |
| A2UCPU-S1    |                    |                |                |                    |                    |                            |
| A2USCPU      |                    |                |                |                    |                    |                            |
| A2USCPU-S1   |                    |                |                |                    |                    |                            |
| A2USHCPU-S1  |                    |                |                |                    |                    |                            |
| A3UCPU       |                    |                |                |                    |                    |                            |

- Reference:**
- The values indicated in the table above are the ranges that can actually be set with the support tool and used by the PT.
  - The ranges actually usable differ according to the system configuration.
  - The values accessed with timers and counters are the timer and counter present values.

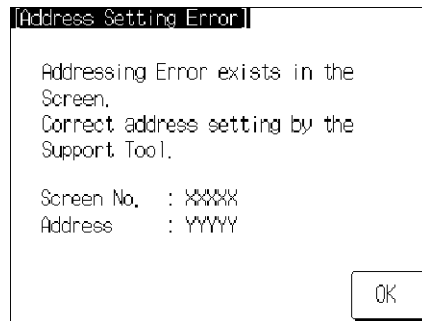
## 2-5 Specific Errors and Their Remedies

This section describes the specific errors that may occur when using the PT in a computer link system that uses Mitsubishi A series PCs, and the remedies to employ when they occur. For errors which occur when using the PT in the ordinal condition and the remedies to employ when they occur, refer to the Operation Manual for the PT model used.

### Setting Errors

If an area that does not exist in the PC is specified when creating a PT screen with the support tool, the screen shown below is displayed during PT operation.

<When using NT31/NT31C or NT631/NT631C>



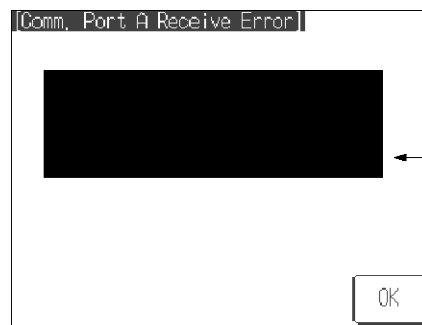
XXXXX: Screen number  
 YYYYY: Device No.

If this happens, first check that the area at the PC being used has been secured, then set the correct device.

### Reception Errors

If a reception error occurs during PT operation, the screen shown below is displayed.

<When using NT31/NT31C or NT631/NT631C>



- <Error contents>
- Parity error
- Over run error
- Flaming error
- Buffer over flow
- Time-out
- PC No. error
- Error response received
- Undefined command error

The errors that occur specifically with computer link systems that use Mitsubishi A series PCs are described below. For details on errors other than those indicated below, refer to the Operation manual for the PT.

| Message            | Cause   | Corrective Action   |
|--------------------|---|---|
| PC Number error    | <ul style="list-style-type: none"> <li>• Due to noise, the data has been changed on the transmission line.</li> </ul>   | <ul style="list-style-type: none"> <li>• If the system is used at a site subject to a lot of noise, use cables with protection against noise on the transmission route.</li> </ul>  |
| Exchange No. error | <ul style="list-style-type: none"> <li>• The station No. at the PC side has been changed.</li> <li>• The PC has sent erroneous data.</li> <li>• Due to noise, the data has been changed on the transmission route.</li> </ul> | <ul style="list-style-type: none"> <li>• Set the station No. at the PC side to "0".</li> <li>• Check the operation at the PC side.</li> <li>• If the system is used at a site subject to a lot of noise, use cables with protection against noise on the transmission route.</li> </ul> |
| Sum check error    | <ul style="list-style-type: none"> <li>• The PC has sent erroneous data.</li> <li>• Due to noise, the data has been changed on the transmission line.</li> </ul>  | <ul style="list-style-type: none"> <li>• Check the operation at the PC side.</li> <li>• If the system is used at a site subject to a lot of noise, use cables with protection against noise on the transmission route.</li> </ul>   |

---

# SECTION 3

## Use With Mitsubishi FX

This section describes how to make the connections and settings when a PT is connected to a Mitsubishi FX series programmable controller.

|     |                              |    |
|-----|------------------------------|----|
| 3-1 | Applicable PTs and PCs ..... | 36 |
| 3-2 | Connection .....             | 37 |
| 3-3 | Setting .....                | 43 |
| 3-4 | Allocation Areas .....       | 49 |

## 3-1 Applicable PTs and PCs

The PT and PC models that can be used with Mitsubishi FX series PCs are indicated here.

### Usable PT Models

The PT models that can be used with the Mitsubishi FX series are tabled below. When using NT31/NT31C, NT631/NT631C, install the system program for Mitsubishi FX in advance using the “NT series system installer”.

| PT Type | Model                                  |
|---------|--|
| NT31    | NT31-ST121□-EV1                        |
| NT31C   | NT31C-ST141□-EV1                       |
| NT631   | NT631-ST211□-EV1                       |
| NT631C  | NT631C-ST141□-EV1<br>NT631C-ST151□-EV1 |

**Reference:** For details on the direct connection function, refer to the Operation manual for the PT model used.

### Modules mounted at the Connected PC

When the connection is to a Mitsubishi FX series PC, the programming console connector of the main base unit is used. The table below lists main base units to which connection is possible.

| Type             | Mode  |   |   |   |   |   |
|------------------|---|---|---|---|---|---|
| FX <sub>0</sub>  | FX <sub>0</sub> -14MR<br>FX <sub>0</sub> -14MR-D  | FX <sub>0</sub> -20MR<br>FX <sub>0</sub> -20MR-D  | FX <sub>0</sub> -30MR<br>FX <sub>0</sub> -30MR-D                        | FX <sub>0</sub> -14MT<br>FX <sub>0</sub> -14MT-D                        | FX <sub>0</sub> -20MT<br>FX <sub>0</sub> -20MT-D                        | FX <sub>0</sub> -30MT<br>FX <sub>0</sub> -30MT-D                        |
| FX <sub>0N</sub> | FX <sub>0N</sub> -40MR  | FX <sub>0N</sub> -60MR  | FX <sub>0N</sub> -40MT  | FX <sub>0N</sub> -60MT  |   |   |
| FX <sub>1</sub>  | FX <sub>1</sub> -16MR<br>FX <sub>1</sub> -16MT  | FX <sub>1</sub> -24MR<br>FX <sub>1</sub> -24MT  | FX <sub>1</sub> -32MR<br>FX <sub>1</sub> -32MT                          | FX <sub>1</sub> -48MR<br>FX <sub>1</sub> -48MT                          | FX <sub>1</sub> -64MR<br>FX <sub>1</sub> -64MT                          | FX <sub>1</sub> -80MR<br>FX <sub>1</sub> -80MT                          |
| FX <sub>2</sub>  | FX <sub>2</sub> -16MR<br>FX <sub>2</sub> -128MR<br>FX <sub>2</sub> -16MS<br>FX <sub>2</sub> -16MT<br>FX <sub>2</sub> -128MT | FX <sub>2</sub> -24MR<br>FX <sub>2</sub> -24MS<br>FX <sub>2</sub> -24MT                                   | FX <sub>2</sub> -32MR<br>FX <sub>2</sub> -32MS<br>FX <sub>2</sub> -32MT | FX <sub>2</sub> -48MR<br>FX <sub>2</sub> -48MS<br>FX <sub>2</sub> -48MT | FX <sub>2</sub> -64MR<br>FX <sub>2</sub> -64MS<br>FX <sub>2</sub> -64MT | FX <sub>2</sub> -80MR<br>FX <sub>2</sub> -80MS<br>FX <sub>2</sub> -80MT |
|                  | FX <sub>2</sub> -24MR-A1<br>FX <sub>2</sub> -24MR-D<br>FX <sub>2</sub> -48MT-D<br>FX <sub>2</sub> -32MT-C                   | FX <sub>2</sub> -48MR-A1<br>FX <sub>2</sub> -48MR-D<br>FX <sub>2</sub> -80MT-D<br>FX <sub>2</sub> -64MT-C | FX <sub>2</sub> -64MR-A1<br>FX <sub>2</sub> -64MR-D                     | FX <sub>2</sub> -80MR-D   |   |   |
| FX <sub>2C</sub> | FX <sub>2C</sub> -64MT  | FX <sub>2C</sub> -96MT  | FX <sub>2C</sub> -128MT   | FX <sub>2C</sub> -160MT   |   |   |

## 3-2 Connection

The connection is made between the RS-232C connector of the PT to the Mitsubishi FX series PC via an RS-232C/RS-422A convertor unit (type NT-AL001). When using NT31/NT31C or NT631/NT631C, connection can be made from a RS-422A connector/terminal block at the PT side.

Make the cables in accordance with the wiring schemes shown in this section, and in accordance with the conditions of use.

The communication connector (terminal block) of each device is as follows:

- NT31/31C
  - Serial port A (RS-232C dedicated connector)
  - Serial port B (switching RS-232C/RS-422A/485 connectors)
- NT631/631C
  - Serial port A (RS-232C dedicated connector)
  - Serial port B (switching RS-232C connector and RS-422A/485 terminal blocks)
- FX Series PC
  - RS-422A connector

## Parts Required for Connection

The connectors, connector covers, crimp terminals, and recommended cables for use with OMRON products are described here.

For details on the connectors, connector covers, and crimp terminals used with Mitsubishi products, refer to the manual for the Mitsubishi product.

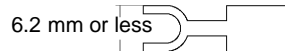
### ● Parts for RS-232C connector (Common to PT and NT-AL001)

| Part            | Model                   | Remarks   |
|-----------------|-------------------------|---|
| Connector       | XM2A-0901               | 9-pin type, made by OMRON                             |
|                 | XM2A-2501               | 25-pin type, made by OMRON                            |
|                 | DE-9P                   | 9-pin type, made by JAE                               |
| Connector cover | XM2S-0911               | 9-pin type, made by OMRON                             |
|                 | XM2A-2511               | 25-pin type, made by OMRON                            |
|                 | DE-CI-J6                | 9-pin type, made by JAE                               |
| Cable           | AWG28X5P<br>IFVV-SB     | Multi-core shielded cable, made by Fujikura, Ltd      |
|                 | CO-MA-VV-SB<br>5PX28AWG | Multi-core shielded cable, made by Hitachi Cable, Ltd |

● Recommended Parts for RS-422A Terminal Blocks (For NT-AL001)

<Appropriate crimp terminals>

Fork type



Round type



| Part                        | Model      | Remarks  |
|-----------------------------|------------|--|
| Crimp terminal (M3)<br>(*1) | Y1.25-3.5L | Fork type, made by Molex                         |
|                             | 1.25-N3A   | Fork type, made by Japan Solderless Terminal MFG |

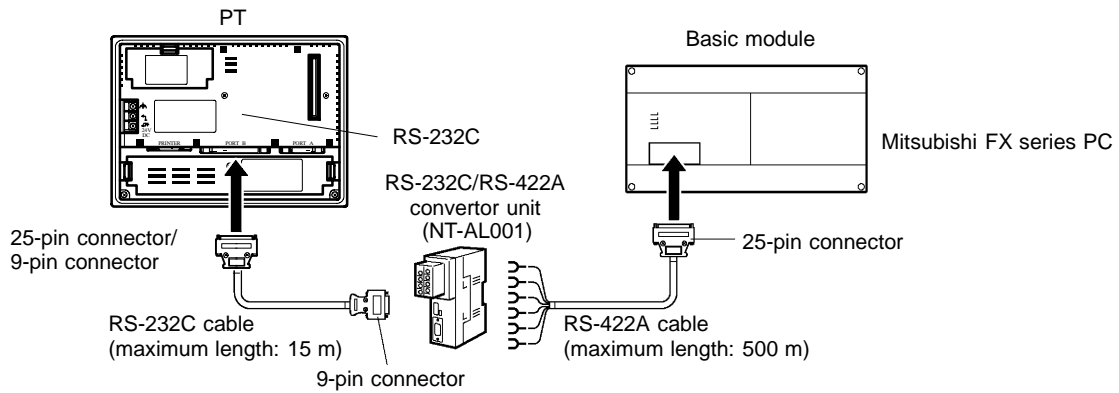
(\*1) Appropriate wire size: 0.3 to 0.75 mm<sup>2</sup>



### When connecting RS-232C (PT) and RS-422A (FX)

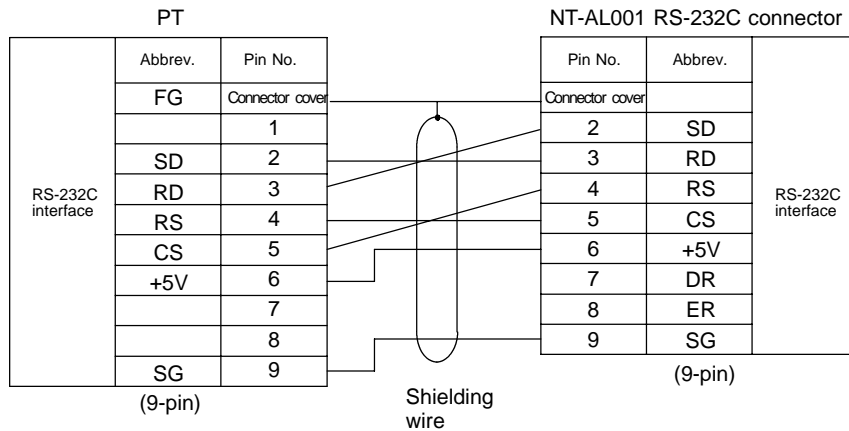
At the PT side, make a connection using the following communication ports.

- NT31/NT31C or NT631/NT631C  
Serial port A (RS-232C dedicated connector)  
or  
Serial port B (RS-232C connector)



- Notice:**
- After connecting a communication cable, always secure it with the screws.
  - When connecting to a terminal block, always use crimp terminals.

#### ● Wiring between PT and NT-AL001

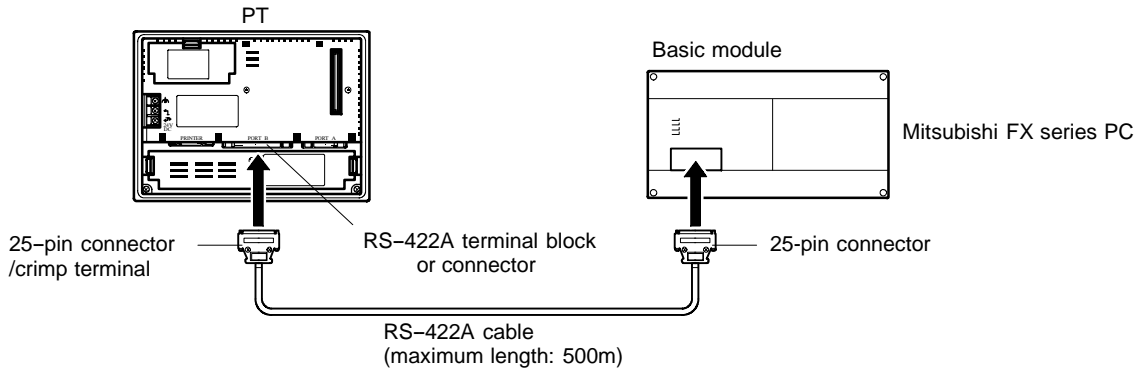




### When connecting RS-422A (PT) and RS-422A (FX)

At the PT side, make a connection using the following communication port:

- NT31/NT31C  
Serial port B (RS-422A connector)
- NT631/NT631C  
Serial port B (RS-422A terminal block)



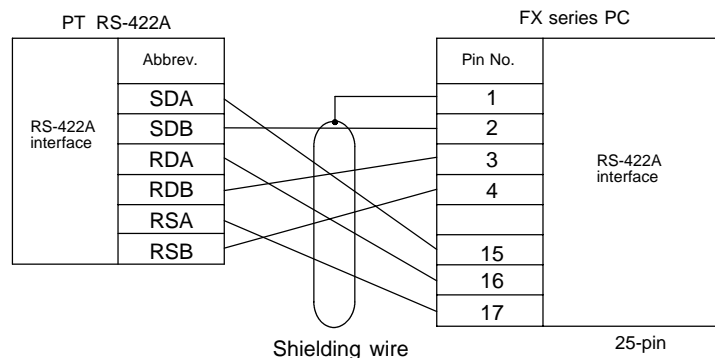
- Notice:**
- After connecting a communication cable, always secure it with the screws.
  - When connecting to a terminal block, always use crimp terminals.

#### ● Wiring Between PT and PC

When using FX1, FX2, or FX2c, connect a cable with the wiring scheme shown below directly to the programming console connector of the PC.

The programming console connectors of FX0 and FX0N have a different shape; with these types connect a cable with the wiring scheme below to an FX-20P-CADP cable made by Mitsubishi, then connect the FX-20P-CADP to the programming console connector of the PC.

Make the connections between SDA and SDB, RDA and RDB, and RSA and RSB with twisted pair wires.

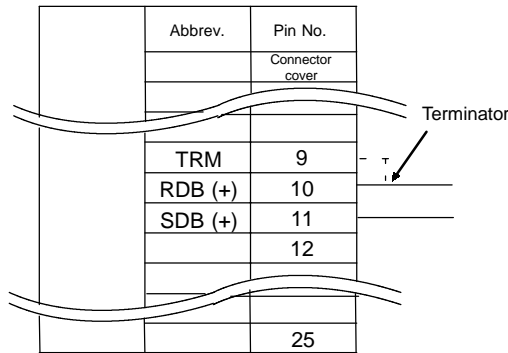


### Setting of Terminator When Using NT31/NT31C or NT631/NT631C

When using NT31/NT31C or NT631/NT631C, terminator present/absent when using RS-422A is set by a “terminal for terminator (TRM)”. When connecting a PT to a Mitsubishi FX series PC with an RS-422A communication, set the terminator at the PT side as follows.

● **When using NT31/NT31C**

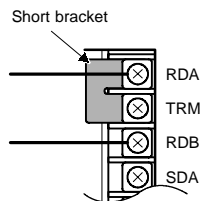
When using NT31/NT31C, there is a “terminal for terminator” on serial port B connector. Short the No.9 and 10 terminals of serial port B inside the connector, and set the terminator to “ON (present)”.



| Between No.9 and 10 terminals | Function   |
|-------------------------------|--|
| Short circuit                 | Terminator ON<br>Shorts only when connecting to the end terminal of the RS-422A/485 cable.                       |
| Open circuit                  | Terminator OFF<br>Opens only when connecting to a terminal other than the end terminal of the RS-422A/485 cable. |

● **When using NT631/NT631C**

When using NT631/NT631C, there is a “terminal for terminator” on serial port B terminal block. Short the TRM and RDA terminals of serial port B using the short bracket, and set the terminator to “ON (present)”.



| Between TRM and RDA terminals | Function  |
|-------------------------------|---|
| Short circuit                 | Terminator ON<br>Shorts only when connecting to the end terminal of the RS-422A/485 cable.                              |
| Open circuit                  | Terminator is absent.<br>Opens only when connecting to a terminal other than the end terminal of the RS-422A/485 cable. |

## 3-3 Setting

This section describes the settings required at each device in order to use the programming console connector of a Mitsubishi FX series PC.

### Settings at the PT

Make the following settings in the PT's maintenance mode by using the memory switches. When using NT30/NT30C, install the system program for Mitsubishi FX in advance using the "NT series system installer".

**Reference:** Set the other memory switches in accordance with the conditions of use.

#### ● When using NT31/NT31C or NT631/NT631C

| Item                   | Setting  |
|------------------------|--|
| Serial port A protocol | Mitsubishi FX, not used, or bar code reader (when Mitsubishi FX is selected for serial port B)   |
| Serial port B protocol | Mitsubishi FX or not used (when Mitsubishi FX is selected for serial port A)   |
| Comm. type             | With FX <sub>0</sub> :FX0<br>With FX <sub>0N</sub> :FX0N<br>With FX <sub>1</sub> :FX1<br>With FX <sub>2</sub> , FX <sub>2C</sub> :FX2/FX2C |

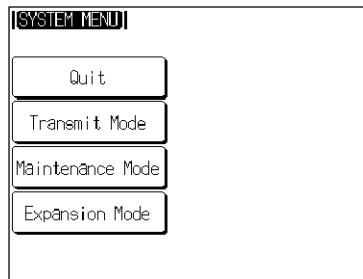
## Operation of the System Menu of the PT

Setting of communication conditions and checking of communication status are performed by operating the system menu of the PT. When using NT31/NT31C or NT631/NT631C, the communication port to be used is also selected by operating the system menu.

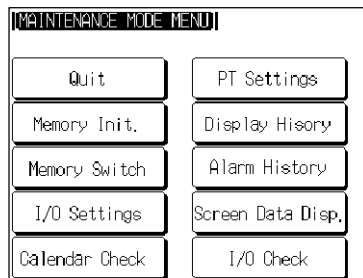
The operation method of the system menu related to the Mitsubishi FX series PC is described here, by taking NT31/NT31C as an example. For the operation of the other system menu, refer to the Operation Manual for the PT model used.

### ● Setting of the Communication Conditions

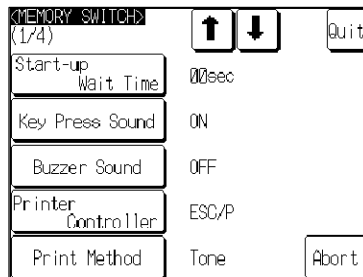
The communication conditions for the computer link system that uses Mitsubishi FX series PCs should be set to serial port A or B by operating the system menu as follows:



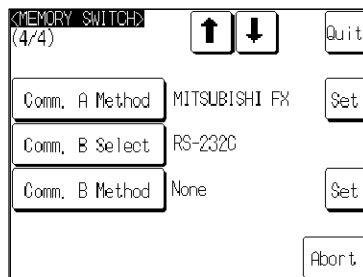
Select "Maintenance Mode".



Select "Memory Switch".

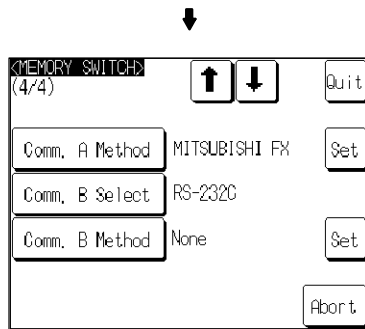


Display the fourth memory switch screen by pressing the [↓] (next screen) or [↑] (previous screen) touch switch.



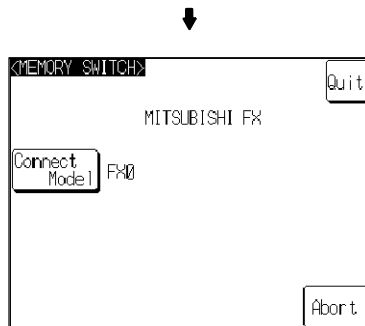
Press the touch switch of the port ("Comm. A Method" or "Comm. B Method"), to which the computer link system that uses Mitsubishi A series PCs is to be set, to display "MITSUBISHI FX".

The display on the right of each touch switch will be changed by pressing the switch.



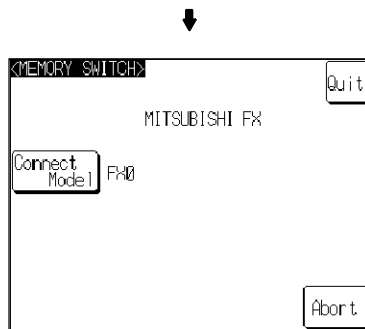
Press the “Set” on the right of the touch switch of the selected port.

The screen on the left shows the case when serial port A is to be used.



Press the “Connect Model” to select the type of the host to be connected.

The display on the right of each touch switch will be changed by pressing the switch.



Press “Quit”.

The selected connected host type and the communication speed are displayed.

- If “Abort” is pressed on the setting screen for connected host type and communication speed, the memory switch setting screen (fourth screen) returns without executing the setting of the connected host type and communication speed.

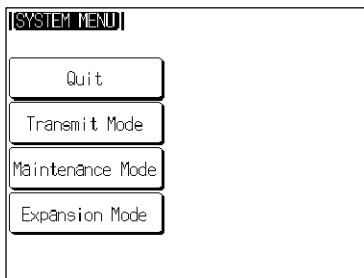
When the setting of connected host type and communication speed is completed, the memory switch setting screen (fourth screen) returns.

To set the other memory switches, switch the screen by pressing [↓] (next screen) or [↑] (previous screen) to select the screen to set the desired setting item.

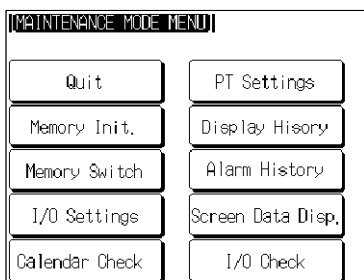
- If “Quit” is pressed on the memory switch setting screen, the memory switch is set as displayed on the screen, then returns to “MAINTENANCE MODE MENU”.
- If “Abort” is pressed on the memory switch setting screen, setting of the memory switch is canceled, then returns to “MAINTENANCE MODE MENU”.

● Check of the Communication I/F

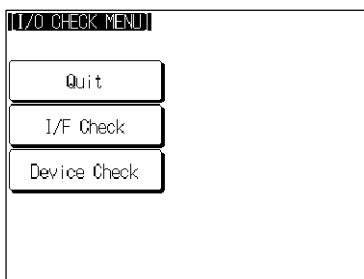
When using NT31/NT31C or NT631/NT631C, the communication when connecting to the computer link system that uses Mitsubishi FX series PCs can be checked by operating as follows.



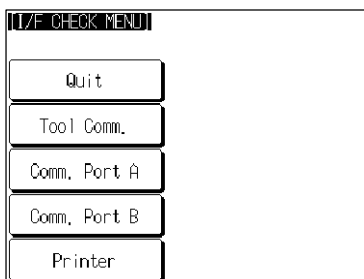
Select "Maintenance Mode".



Select "I/O Check".



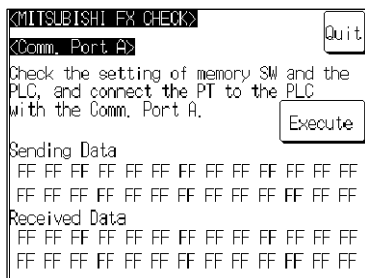
Select "I/F Check".



Select "Comm. Port A" or "Comm. Port B".  
The check screen appears.







To execute checking, press "Execute".

The data is transmitted to the host for checking the communication and displayed on "Sending Data" in hexadecimal.

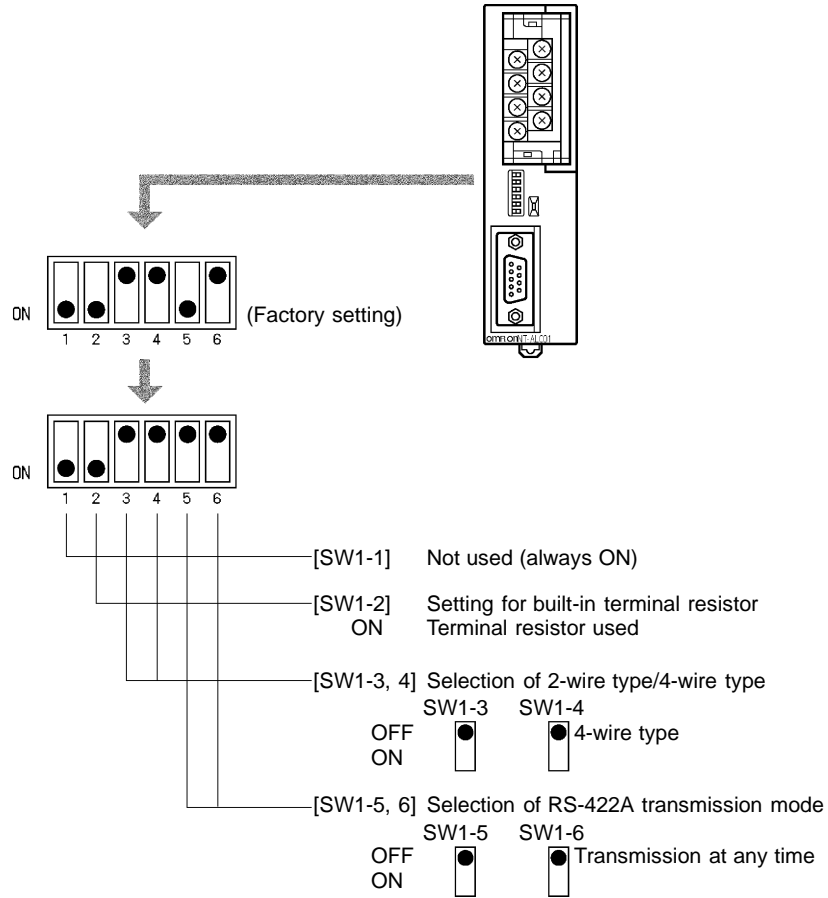
The screen on the left shows the case when serial port A is to be checked.

- If the communication with the host is performed normally, the response from the host is displayed on "Received Data" in hexadecimal.
- If the communication with the host is not performed normally, the communication error display (serial port A communication error) appears.

If the communication error display appears on the communication I/F check screen, there is a problem in communication. Check the setting of the communication table, memory switch, or host.

### Settings at the NT-AL001

When using the RS-232C/RS-422 convertor unit (NT-AL001), set the RS-422A communication conditions with the DIP switches as shown in the figure below.



### PC Settings

No particular settings have to be made at the PC in order to use the PT with a programming console connector.

## 3-4 Allocation Areas

This section describes the types of area to which bits and words can be allocated, and the ranges of these areas for each PC.

### Bits and Words Allocated to the PC

Bits and words can be allocated to Mitsubishi FX series PCs as follows.

| Symbol | Area Name       | Bit | Word          |                                 |
|--------|-----------------|-----|---------------|---------------------------------|
|        |                 |     | Numeric Value | Character String <sup>(*)</sup> |
| D      | Data registers  | ✓   | ✓             | ✓                               |
| M      | Internal relays | ✓   | ✓             | ✓                               |
| T      | Timers          | ×   | □ 1           | ×                               |
| C      | Counters        | ×   | □ 2           | ×                               |
| S      | State relays    | ✓   | ✓             | ✓                               |
| X      | Input relays    | ✓   | ✓             | ✓                               |
| Y      | Output relays   | ✓   | ✓             | ✓                               |

(\*) Includes the PT status control area and PT status notify area

✓ : Possible

□ 1: Possible (1 word only)

□ 2: For C0 to C199, 1 word possible; for C200 and higher, 2 words possible

× : Not possible

**Reference:** Allocations cannot be made to the special use areas for data registers (D) and auxiliary registers (M).

#### ● Restrictions on Use

The restrictions and cautions that apply specifically when using a PT with a computer link system that uses Mitsubishi FX series PCs are presented here. For details on other, general restrictions, refer to the Operation Manual for the PT model used.

#### Values usable by the PT

- When using NT31/NT31C or NT631/NT631C  
The value representation used in the PT can be specified to "BCD" (binary coded decimal) or "binary" (hexadecimal).  
The value representation (BCD/binary) can be specified for all memory tables at once by using the support tool "PT configuration" – "system" – "Numeral storage type".  
The representation of the values can be specified for each memory table.

**Bit notification**

Notification can be conducted in bit units to bit devices. In this case, the bits other than those used for notification will not be changed.

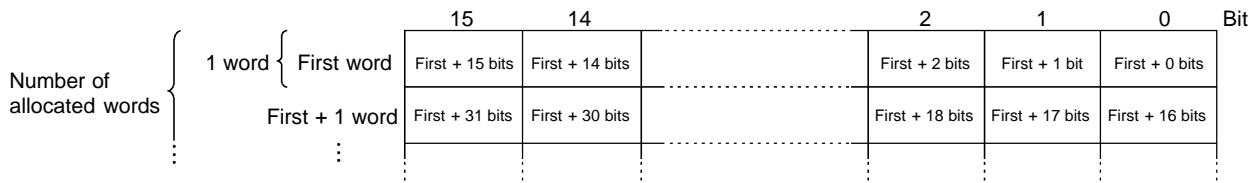
To word devices, notification is conducted in word units, and the other bits in the same word of the bit used for notification may be changed (on the notification contact between the momentary touch switch and the external I/O input, the other bit in the same word will be cleared to "0").

**Points to be noted when allocating words to bit devices other than X and Y**

When notifying in word units to the bit devices, the PT is accessed in 16-bit units. Therefore, when allocating words (channels) to bit devices, be sure to set a device No. which is a multiple of 16.

**Points to be noted when allocating to X (input relays) and Y (output relays)**

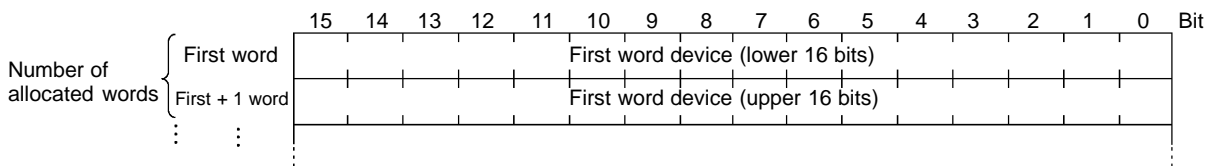
In X and Y, the device No. is expressed in octal. Therefore, when allocating words (channels) to X or Y, ensure that the last two digits of the device Nos. are "00", "20", "40", or "60".



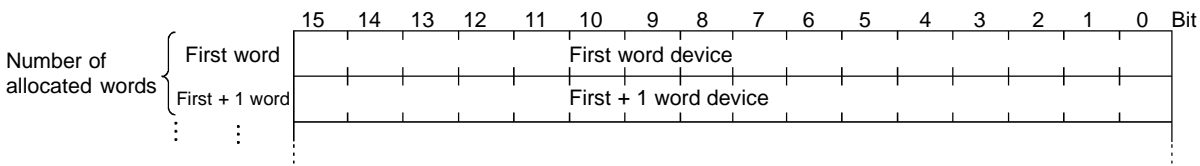
**Points to be noted when using word devices**

The word device D (data register) can be used for both bit and word allocation. In all areas of T (timer) and C0 - 199 of C (counter), each device is 16 bits and occupies 1 word (channel). In the case of counter C200 and higher, one word device is 32 bits and occupies 2 words (channel).

**• Normal device**



**• 32-bit devices from C200 onward**



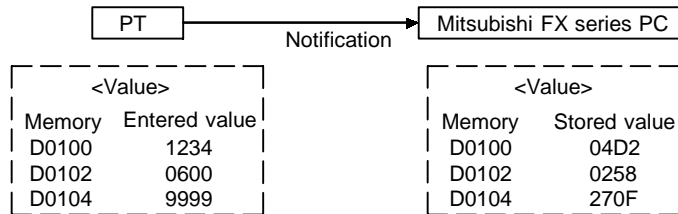
**Numeral storage type at the PT side**

When using NT31/NT31C or NT631/NT631C, the values can be stored in the host in BCD or binary (hexadecimal) by specifying “value representation”.

The representation normally used in the Mitsubishi FX series PC is binary. Therefore, by specifying the value representation at the PT side to “binary”, the values changed at the PT side can be notified as they are to the host.

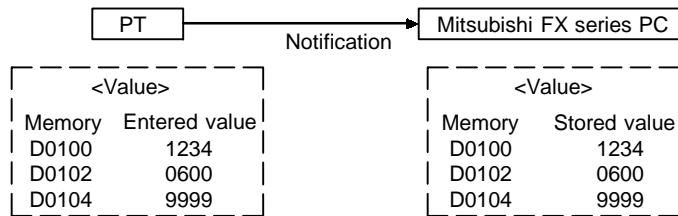
(Example) When the value representation at the PT side is specified to “BCD”, the value is entered at the PT side:

(Allocated channel: 1 channel)



(Example) When the value representation at the PT side is specified to “binary”, the value is entered at the PT side:

(Allocated channel: 1 channel)



- Reference:**
- When using a PT in which “Numeral storage type” can be specified, the value representation can be specified to “BCD” or “binary” for all the value memory tables, or by each value memory table.
  - For the details on how to use the value representation, refer to Operation Manual for NT31/NT31C or NT631/NTC (V043-E1-□, V044-E1-□). For the details on how to specify the value representation, refer to Operation Manual for NT series Support Tool for Windows 95/98 (Ver. 3.0) (V053-E1-□).

### Mitsubishi FX Series PC Allocation Areas

| Type                                | Unit | Data Registers (D) | Auxiliary Relays (M) | Timers (T) | Counters (C) | State Relays (S) | Input Relays (X) | Output Relays (Y) |
|-------------------------------------|------|--------------------|----------------------|------------|--------------|------------------|------------------|-------------------|
| FX <sub>0</sub>                     | Bit  | ---                | M0 to M511           | ---        | ---          | S0 to S63        | X0 to X177       | X0 to X177        |
| FX <sub>0N</sub>                    | Word | D0 to D31          | M0 to M496           | T0 to T55  | C0 to C254   | S0 to S48        | X0 to X17        | Y0 to Y17         |
| FX <sub>1</sub>                     | Bit  | ---                | M0 to M1023          | ---        | ---          | S0 to S999       | X0 to X177       | X0 to X177        |
|                                     | Word | D0 to D127         | M0 to M1008          | T0 to T245 | C0 to C254   | S0 to S984       | X0 to X17        | Y0 to Y17         |
| FX <sub>2</sub><br>FX <sub>2C</sub> | Bit  | ---                | M0 to M1023          | ---        | ---          | S0 to S999       | X0 to X177       | X0 to X177        |
|                                     | Word | D0 to D511         | M0 to M1008          | T0 to T255 | C0 to C255   | S0 to S984       | X0 to X17        | Y0 to Y17         |

**Reference:** • The values indicated in the table above are the ranges that can actually be set with the support tool and used by the PT.

- The ranges actually usable differ according to the system configuration.

---

## **APPENDIX**

This section describes the specifications of the connectors of OMRON products used for communications.

|            |  |    |
|------------|--|----|
| APPENDIX A | OMRON Product Connector Specifications ..... | 54 |
|------------|--|----|

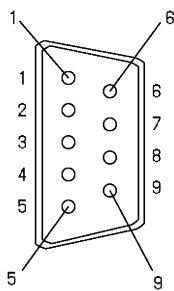
## APPENDIX A

### OMRON Product Connector Specifications

#### PT Connectors

● **RS-232C connector specifications**

- Connector type : RS-232C connector (9-pin)
- Electrical characteristics : Conform to EIA RS-232C
- Connection signals

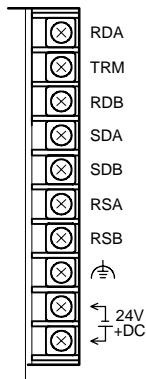


| Connector Pin No. | Signal Name                     | Abbreviation | Signal Direction<br>PT ↔ External Device |
|-------------------|---------------------------------|--------------|--|
| 1                 | Not used                        | -            | -  |
| 2                 | Send data                       | SD (TxD)     | □  |
| 3                 | Receive data                    | RD (RxD)     | □  |
| 4                 | Request to send                 | RS (RTS)     | □  |
| 5                 | Clear to send                   | CS (CTS)     | □  |
| 6                 | +5V for convertor (max. 150 mA) | +5V          | □  |
| 9                 | Signal ground                   | SG           | -  |

(\*) For NT631/NT631C serial port B, there is no +5V output.

**RS-422A terminal block of NT631/NT631C**

- Connection terminal block : RS-422A terminal block (M3.5 screw)
- Electrical characteristics : Conform to EIA RS-422A
- Connection signals

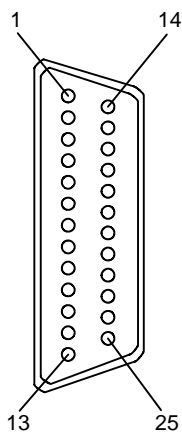


| Signal Name         | Abbreviation | Signal Direction<br>PT ↔ External Device |
|---------------------|--------------|--|
| Receive data (-)    | RDA          | □  |
| Send resistor       | TRM          | -  |
| Receive data (+)    | RDB          | □  |
| Send data (-)       | SDA          | □  |
| Send data (+)       | SDB          | □  |
| Request to send (-) | RSA          | □  |
| Request to send (+) | RSB          | □  |
| Functional earth    |              | -  |



● RS-232C/RS-422A Share Connector Specifications (Only NT31/NT31C)

- Connected terminal block : 25-pin connector
- Electrical characteristics : Conform to EIA RS-232C and 422A
- Connection signals

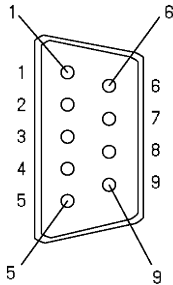


| Connector Pin No. | Signal Name                   | Abbreviation | Signal Direction<br>PT ↔ External Device |
|-------------------|-------------------------------|--------------|--|
| 2                 | Send data (RS-232C)           | SD (TxD)     | □  |
| 3                 | Receive data (RS-232C)        | RD (RxD)     | □  |
| 4                 | Request to send (RS-232C)     | RS (RTS)     | □  |
| 5                 | Data send ready (RS-232C)     | CS (CTS)     | □  |
| 7                 | Signal ground                 | SG           | -  |
| 9                 | Terminator (RS-422A)          | TRM          | -  |
| 10                | Receive data (+) (RS-422A)    | RDB (+)      | □  |
| 11                | Send data (+) (RS-422A)       | SDB (+)      | □  |
| 15                | Send data (-) (RS-422A)       | SDA (-)      | □  |
| 16                | Receive data (-) (RS-422A)    | RDA (-)      | □  |
| 23                | Request to send (+) (RS-422A) | RSB (+)      | □  |
| 24                | Request to send (-) (RS-422A) | RSA (-)      | □  |

### RS-232C/RS-422 Converter Unit (NT-AL001)

● RS-232C connector specifications

- Connector type : RS-232C connector (9-pin)
- Electrical characteristics : Conform to EIA RS-232C
- Connection signals



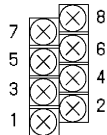
| Connector Pin No. | Signal Name  | Abbreviation | Signal Direction PT ↔ External Device |
|-------------------|--|--------------|---------------------------------------|
| Connector cover   | Grounding or earth for safety purposes                 | FG           | -                                     |
| 1                 | Not used   | -            | -                                     |
| 2                 | Send data  | SD (TxD)     | □                                     |
| 3                 | Receive data   | RD (RxD)     | □                                     |
| 4                 | Receive dataRequest to send (shorted to CS internally) | RS (RTS)     | □                                     |
| 5                 | Clear to send (shorted to RS internally)               | CS (CTS)     | □                                     |
| 6                 | +5V for convertor (150 mA)                             | +5V          | □                                     |
| 7                 | Data set ready (shorted to ER internally) *            | DR (DSR)     | - *                                   |
| 8                 | Data terminal ready (shorted to DR internally) *       | ER (DTR)     | - *                                   |
| 9                 | Signal ground  | SG (GND)     | -                                     |

- The connector cover is connected to the functional ground terminal (pin No.1) of the RS-422A terminal block.

\* Pins No.7 and No.8 are connected internally to each other and do not have the function as the control lines.

● RS-422A terminal block specifications

- Connected terminal block : RS-422A terminal block (M3 screw)
- Electrical characteristics : Conform to EIA RS-422A
- Connection signals



| Connector Pin No. | Signal Name         | Abbreviation | Signal Direction PT ↔ External Device |
|-------------------|---------------------|--------------|---------------------------------------|
| 1                 | Functional ground   | FG           | -                                     |
| 2                 | Signal ground       | SG (GND)     | -                                     |
| 3                 | Send data (+)       | SDB          | □                                     |
| 4                 | Send data (-)       | SDA          | □                                     |
| 5                 | Receive data (+)    | RDB          | □                                     |
| 6                 | Receive data (-)    | RDA          | □                                     |
| 7                 | Request to send (+) | CSB          | □                                     |
| 8                 | Request to send (-) | CSA          | □                                     |

**Note:** The CSB and CSA signals are for special applications.

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## Revision History

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↑  
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| Revision code | Date       | Revised content     |
|---------------|------------|---------------------|
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